HORTICULTURAL ABSTRACTS

Vol. XIV September 1944 No. 3

Initialled reviews and abstracts are by R. J. Garner, W. G. Keyworth, W. S. Rogers and H. Wormald of the East Malling Research Station. Other initialled abstracts are by courtesy of the Editors of " Biological Abstracts ".

INDEX OF CONTENTS.

MISCELLANEOUS.

General.

969. Barker, B. T. P. 633/635+664.84/85
Agricultural and horticultural research in war time.
Pamphl. Bath and West and Southern Counties Soc. **10**, 1943, pp. 58, bibl. 31.

After a very brief account of the origin and development of the National Fruit and Cider Institute, the Long Ashton Research Station, the Bristol Agricultural Advisory Centre and the Campden Research Station, the author deals with the main features of the work carried on at them during the war. In conjunction with East Malling, the Ministry of Agriculture and the Agricultural Improvement Committee, the Long Ashton Research Station is arranging for the provision of adequate stocks of nursery material of both top and soft fruits to meet post-war demands. Vegetable cultivation and its problems are under trial and results are being demonstrated. Plant nutritional investigations, which at the outbreak of the war largely concerned fruit crops, have been extended intensively to agricultural and vegetable crops and use is made of so-called indicator plants to show up deficiencies in different areas. The exact use of these plants is outlined. The numerous activities of the plant pathological staffs of the University of Bristol and of the Research Station are set out. They include investigations into new methods of control of pests and diseases and weeds, into the control of pests resulting from air raids, into seed dressings for vegetable seed, into wireworms and leatherjackets. Fruit products investigations have included work on the retention of natural sweetness in cider, on the production of light apple wines, on the utilization of apple pomace, on the production of palatable black currant and rose hip products, of apple juice concentrates, of malic acid, of various plum products, on the conversion of surplus carrots into more stable usable products. Further, work on domestic preservation of fruit and vegetables has been particularly useful. The work of the Bristol Advisory Centre increases yearly. Abstracts are included of a number of reports or surveys on foodstuffs, manures, etc. Flax manurial and variety trials are in progress. The satisfactory progress of the Campden Research Station is noted. Problems recently studied by its staff include the setting up of quality standards for canned fruits and vegetables, hydrogen swells, factors affecting the nutritional value of canned food and tin plate economy.

970. Hartley, W. 63(072)
The economic consequences of agricultural research.
J. Aust. Inst. agric. Sci., 1943, **9**: 163-6.

It is suggested that successful agricultural research may sometimes have unforeseen results. It may cheapen the product to a point where it is no longer profitable to produce it, or, since the application of results of agricultural research always means the expenditure of money, it tends to benefit the large grower who can afford the outlay, to the detriment of the marginal grower who cannot and so is driven out of business, and thus all producers are by no means benefited alike. Research designed to increase production by reducing unit costs is questionably useful in the case of perishable products. On the other hand research designed to overcome seasonal fluctuations or to improve the lot of the marginal producer, or to reduce unit costs in cases in which production is only maintained by protection in the form of tariffs and bounties would be beneficial. A number of problems likely to arise in Australian primary production at the conclusion of the war are considered in their relation to the possible trend of research. The need for a joint enquiry of economists and agricultural scientists to clarify the issues and to guide research into directions where it could most benefit the greatest number is urgent, and further would help to ensure that any long-term research project undertaken could be carried through to a conclusion.

971. Miles, H. W. 633/635
A national advisory service for agriculture and horticulture.
Nature, 1944, **153**: 611-3.

An examination of the Government proposals, based on the Luxmoore Report, to unify the present provincial and county agricultural advisory services into one national service for the whole country. The lack of proposals for

the co-ordination and integration of advisory and research services is criticized. It is curious that the work of the Research Stations should have been excluded from the enquiry since advisory and research services are essentially interdependent and the work of each provides stimulus for the other. The Luxmoore Report, too, makes no provision for the co-ordination of the work of specialist advisers in the respective sciences and suggestions are made for changing this. Under the national scheme, as explained by the Secretary of the Luxmoore Committee to the Association of Applied Biologists, there will be greatly increased opportunities for promotion and improved professional status compared with those existing under the present county scheme, and capable and energetic men would be attracted. In reply to a criticism that the removal of specialist advisers from the University departments would lower the status of the specialists and weaken their ties with other scientific workers, it was stated that, although the provincial centres were no longer to be administered by the universities, they would be established in university towns.

972. Australian Institute of Agricultural Science, Victorian Branch. 63: 371.2/3
Agricultural education in Victoria.
J. Aust. Inst. agric. Sci., 1943, **9**: 141-53.

The report on post-war agricultural education in Victoria represents the views of the members of the Victorian Branch of the Australian Institute of Agricultural Science. Those members who are officers of the Department of Agriculture did not participate, having been concerned in a Departmental Report. Agricultural education is considered in two main divisions, namely (1) education in the farming community, and (2) university and post-graduate training.

973. Baikov, A. A. 575/577(47)
The Academy of Sciences of the U.S.S.R. during the last 25 years. [Russian.]
Jubilee Session of the Academy of Sciences of the U.S.S.R.,* 1943, pp. 28-53.
Orbeli, L. A.
Development of biological sciences in the U.S.S.R. during the last 25 years. [Russian.]
Jubilee Session of the Academy of Sciences of the U.S.S.R., 1943, pp. 216-27.

The first paper in particular gives a fairly detailed account of the progress in organization of biological research in U.S.S.R. achieved up to and even later than the outbreak of the present war.

974. Avdonin, N. 633/635
Some results of scientific work during a year of war (1941). [Russian.]
Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture), 1942, No. 6-7, pp. 45-52.

The author deals in this article with the work carried out during 1941 in the (1) Siberian Cereal Institute, (2) South-Eastern Cereal Institute, (3) Non-Blackearth Zone Cereal Institute, (4) Federal Agronomical and Forest Amelioration Institute, (5) Federal Cotton Institute, (6) Azerbaïdjan Cotton Institute, (7) Institute of Cotton Growing in New Areas, (8) Flax Institute, (9) Institute of Rubber Bearing Plants, (10) Federal Selection Station for Humid-Subtropical Crops and (11) Batum Botanical Garden. Of interest to horticulturists is the fact that (1) has produced one early variety of pea, two early varieties of potato; established the feasibility of growing sugar beet and kok saghyz in Siberia; and prepared a soil and climate map of the Eastern Areas of the U.S.S.R. (2) has elaborated new methods of soil moisture control in areas liable to drought; established the efficacy of mineral fertilizers and green manure for irrigated crops; proved the feasibility of growing kok saghyz and sugar beet under irrigation; produced three varieties of sunflower (oil) and one variety of *Pennisetum typhoideum*. (3) has manufactured large quantities of *Pyrethrum* compounds; perfected a new method of preparation of azotobacter from dry cultures, and used seedlings extensively for the propagation of kok saghyz, with a 90% survival. (4) has discovered five species of sweet-briar with a high carotene content in their leaves; found good varieties of willow for the production of tanning extracts; and worked out methods of cultivation and exploitation of *Euonymus verrucosa*. (8) has produced a *Fusarium*-resistant strain of flax, and one that is proof against lodging; studied red clover as a precursor crop for flax, and the effect of mineral fertilizers on the development and yield of clover; and designed a number of mechanical devices for petrol and heavy oil-driven tractors. (9) has concentrated on the agronomical and breeding technique of kok saghyz; studied the phytopathology of the plant; elaborated effective methods of pest control; designed and constructed a number of sowing, cultivating, root and seed harvesting machines and implements which have proved efficacious in field conditions; and carried out considerable work in introducing kok saghyz and guayule into new areas. (10) has developed a method of grafting *Cinchona* with high alkaloid content on the rootstocks of *Cinchona succirubra*, which is said to be conducive to abundant growth and development; elaborated a number of agricultural methods which accelerate the hardening of the bark and enhance the yield; introduced the cultivation of sweet potatoes; and investigated the practicability of cultivating exotic medicinal plants in the U.S.S.R. (11) has investigated the feasibility of growing locally a number of exotic sub-tropical plants which are said to possess a specific anti-malarial property, and of other medicinal plants; worked out the problem of using as camouflage dyes of the pigments of a number of trial plants; and elaborated processes for obtaining vitamin B and C concentrates from *Citrus* waste products.

975. Iljin, M. M. 633/635-1.56
Results of investigations into raw materials in the U.S.S.R. during the period of Soviet rule. [Russian.]
Sovetskaja Botanika, 1942, **6**: 24-40.

Many plants, the scientific names of which are mentioned in the course of this article, may be found growing wild throughout the U.S.S.R. and in other parts of the world. They have yielded materials necessary for food, medicine, and industry. Some of the plants are of common occurrence. Among the substances which have been obtained, or which it is hoped may be obtained, from them are the following: Rubber from species of the *Compositae*, *Convolvulaceae*, *Caprifoliaceae*, and *Rubiaceae*; and guttapercha from both the bark of the stem as well as from the roots of *Euonymus*. A practical method of extracting rubber secreted in parenchyma tissue is unknown. Resins and gums are being obtained from conifers, species of *Euphorbia* and from plants of the *Umbelliferae*. Conifers are proving to be the source of many other substances besides. Tanning materials have been found in the foliage as well as in the bark of many trees and shrubs. About 80 species of plant have been found to contain various alkaloids. *Tephrosia*, *Artemisia* and *Veratrum* spp. are being investigated as sources of insecticides and other substances for destroying parasites. Essential oils may be extracted from *Artemisia*, some species of which contain also camphor. Many other plants are mentioned from which oil, vitamins, drugs and fibres might be produced.

976. Struthers, J. 63(52)
Japan's agriculture.
Agriculture, 1944, **51**: 63-7.

Not far short of 60% of the whole arable area of Japan is under rice. Next to rice comes sericulture and just before the war nearly 80% of the world's total silk supply came from Japan. Mulberry growing is studied and understood and over 70 varieties of mulberry are officially encouraged.

* A full English abstract of this paper has been made and is available from the Imperial Bureau of Plant Breeding, School of Botany, Cambridge.

ne silkworm side of the industry is most rigorously pervised. Japan is nearly self-supporting in tea which is the green or unfermented type. Barley, wheat, millet, e and beans form the main items of food for all persons low the rice-eating class, i.e. the peasantry and lower dustrial workers. Sweet potatoes are extensively grown. ext come radishes (a very large type), sugar potato (ataro), eks, brassicas, burdocks and eggplants. Irish potatoes e also grown. The most important indigenous fruits are anges, persimmons and a native pear. The production peaches, cherries, ordinary pears, apples and grapes is a smaller scale. The export trade in oranges before the ar was considerable, especially for the Christmas trade the U.S., Canada and Great Britain. Attempts to develop gar beet have not been successful. Tobacco growing is ntrolled by the State and there was a large trade in this mounting to 132,000,000 lb. yearly.

77. TRUMBLE, H. C. 63
Agronomy.
J. Aust. Inst. agric. Sci., 1943, **9**: 167-73, bibl. 10.
he nature of agronomy as a branch of scientific research agriculture under Australian conditions is discussed.

78. LIGOULE M, J. 026: 63(824.5)
La biblioteca de la estación experimental agricola de Tucumán, su organización. **(The library of the Tucuman agricultural experimental station and its organization.)**
Publ. misc. Estac. exp. agric. Tucumán **2**, 1943, pp. 137.
very full account of the indexing system used by the brary of the Tucuman Experiment Station for all the ublications received. The International Decimal Classifiation system is used and an account of its working is given. o anyone about to start a similar library the information n how to index and card different publications cannot fail be useful. A list of periodicals received under Countries also included.

79. EGLER, F. E. 581.46/47
The fructus and the fruit.
Chron. bot., 1943, **7**: 391-5, bibl. 8.
is the author's object to establish the term *fructus* in cientific literature because of its great value for teaching urposes, too many usages of the word "fruit" being ommon in the English language. The definition of *fructus* mong the *Angiospermae* is: "One ripened gynoecium of ne or several pistils containing the seed or seeds, together ith any developed accessories such as floral parts, bracts, ynophore, hypanthium, receptacle and/or stem. . . . he two words *flower* and *fructus* are thus linked and refer a single plant organ which differs only in stage of ontoeny." The term *fructus clusters* is introduced for such uit clusters as develop from inflorescences of the mulberry nd fig. A classification of *fructus* is given.

80. MOORE, L. B. 582.6
War-time interest in marine algae.
Chron. bot., 1943, **7**: 406-9, bibl. 28.
A survey of the utilization of algae is given under the ollowing headings: The first world war, the years of peace, ewer trends, food, fertilizer, agar, carrageen, alginic acid, ost-war prospects.

81. CURTIS, L. C. 581.11
The exudation of glutamine from lawn grass.
Plant Physiol., 1944, **19**: 1-5, bibl. 6.
After 10-5-5 fertilizer, high in ammonium sulphate and otassium chloride, had been applied to a lawn and the lawn mmediately watered with a hose, the grass guttated profusely the same night, the water remaining on the plant until the middle of the morning. After this had dried a small white deposit was found to be attached to the tip and side of most of the grass blades, in such quantity as to give the lawn a whitish appearance which became increasingly conspicuous for 3 days. The deposit, analysed at the Connecticut Experiment Station, was found to consist mainly of glutamine at the equivalent of 6·78 g. per kilo of fresh material. Attempts to reproduce the phenomenon of glutamine exudation have failed. The function of guttation is discussed, the author contends that one function is to eliminate materials temporarily in excess of the requirements of the plant, that an excretory system is as necessary to plants as it is to animals and that the water absorbed by the roots is the most important material that the plant needs to excrete.

982. TINGLEY, M. A. 581.1
Concentration gradients in plant exudates with reference to the mechanism of translocation.
Amer. J. Bot., 1944, **31**: 30-8, bibl. 23.
A study of the concentration of soluble solids in the exudate from cut tissues of *Tropaeolum majus* and from certain cucurbits was made by means of the Abbé refractometer, since the Barger method for the determination of osmotic concentrations was found inadequate. Exudate from successive cuts became progressively less concentrated in soluble solids, so that for comparative purposes it was necessary to determine the concentration of exudate from a single cut per plant and to subject the data to statistical analysis, since the exudate from corresponding regions of comparable plants varied in concentration. The concentrations were higher in the exudate of the young growing regions or rapidly growing fruit than in that from leaves and petioles. Elsewhere in the plant it was more uniform. Wilting indicated that the highest osmotic concentrations are in the phloem of the apical regions and of young fruits. Gradients were in the reverse direction to that required by the Münch hypothesis of translocation. The investigations were carried out at Milwaukee-Downer College, Wis.

983. CURTIS, L. C. 581.11
Deleterious effects of guttated fluids on foliage.
Amer. J. Bot., 1943, **30**: 778-81, bibl. 7.
Guttation or the exudation of drops of fluid by the leaves of plants usually occurs under conditions of reduced transpiration combined with unabated water and nutrient absorption by the roots. A hypothesis is advanced to associate this phenomenon with tip burn through damage caused by the high salt concentration on the exterior of the leaf, or these deposits may go into solution in subsequent guttation and be sucked back into the leaf where the hypertonic solution may kill the cells. New products toxic to the internal cells may also have been produced in the guttation fluid by bacteria, moulds or enzymes. The studies were made at Connecticut University.

984. PINTO DA SILVA, A. R. 581.9(469)
Algumas considerações sôbre as plantas vasculares subespontâneas em Portugal. **(Vascular plants living subspontaneously in Portugal.)** [English summary ¼ p.]
Agron. lusit., 1942, **4**: 213-21.
The geographic area to which the plants are peculiar and the mode of introduction, distribution and spread of the subspontaneous vascular flora of Portugal have been studied. Most are escapes or derived from plants no longer cultivated. Fifty-six subspontaneous plants have arrived without man's deliberate assistance, 30% of them in the last 26 years. Escapes from other countries can do considerable harm to the native flora and the import of foreign seed should be under control.

Photoperiodism and photosynthesis

985. THUT, H. F., AND LOOMIS, W. E. 612.014.44: 581.14
Relation of light to growth of plants.
Plant Physiol., 1944, **19**: 117-30, bibl. 23.
Field measurements of growth in *Zea mays*, *Asparagus officinalis*, *Polygonum convolvulus* and *Ricinus communis*

at Iowa State College showed that growth increased with temperature, i.e. in sunlight, but was liable to be checked by water deficits within the plant. Sunlight has no direct effect upon growth but increases it indirectly by increasing photosynthesis and raising the temperature. Excessive temperature decreases growth. Field plants were less affected by water deficits with high soil moisture than pot grown plants. The roots of field grown plants probably develop a greater absorptive area. Sharp daytime checks in growth were observed when the principal absorption was occurring 2 feet from the base of plants with roots 3 feet or more long. With large leaves the action of auxins in increasing the plasticity of expanding cells may be more important than turgor pressure in cell enlargement. Greater growth was made in daytime when temperature was the limiting factor and at night when moisture was limiting. The interaction of these two factors often produced a double peak of early morning and evening growth.

986. EMERSON, R. L., STAUFFER, J. F., AND UMBREIT, W. W. 612.014.44: 581.192
Relationships between phosphorylation and photosynthesis in *Chlorella*.
Amer. J. Bot., 1944, **31**: 107-20, bibl. 63.
This paper is devoted to a consideration of a theory of photosynthesis involving the basic assumption that the absorption of light energy by the chlorophyll system results in the formation of "energy-rich" phosphate. Several advantages of this hypothesis are described together with certain suggestions regarding the type of studies which might prove profitable. Experiments were made on phosphorylation in *Chlorella pyrenoidosa*. [From authors' summary.] The investigations were carried out at the University of Wisconsin.

987. WITHROW, R. B., AND WITHROW, A. P. 612.014.44
Effect of intermittent irradiation on photoperiodic responses.
Plant Physiol., 1944, **19**: 6-18, bibl. 9.
The results of experiments with spinach, soybean and other plants at Purdue University, Indiana, show that (1) the region of saturation of the photochemical reaction for most of the plants used is in the neighbourhood of one foot candle, since further increases in irradiance failed to bring about corresponding increases in the photoperiodic responses, and (2) the greater the length of the dark period between irradiation cycles, the less the efficiency of the radiant energy in promoting the long-photoperiod responses, with the efficiency falling off rapidly when the dark periods were about 90 minutes or longer for spinach and Biloxi soybean. In all cases continuous irradiation resulted in the highest efficiency. From these results, a theory has been postulated concerning the kinetics of the photoperiodic reaction based on two relationships which appear to limit the photochemical reaction: namely (1) the relatively slow rate of the non-photochemical reaction which follows the substance to be photoactivated; and (2) the relatively low equilibrium concentration which this substance attains during long periods of darkness. On the basis of this type of reasoning, without either of these two limiting factors photoperiodism could not exist. [From authors' summary.]

988. VOBLIKOVA, T. V. 581.12: 581.144.4
Rate of photosynthesis and respiration of the leaf in relation to its age.
C.R. Acad. Sci. U.R.S.S., 1941, **33**: 76-7, bibl. 5.
Trials on spinach leaves under artificial light show that as the leaf ages its rate of photosynthesis and respiration goes down. Similar results with other leaves indicate that, at least under conditions of artificial light, the gas metabolism of a leaf decreases gradually once the leaf has reached about half its maximum size. This fact must be remembered in making physiological examination of leaf processes.

989. KUPREVIČ, V. F. 581.12
Scientific notes—the absorption of CO_2 from soil solutions by plants during photosynthesis. [Russian.]
Sovetskaja Botanika, 1940, No. 1, pp. 70-1.
An experiment is briefly described in which potato leaves were immersed in solutions containing different amounts of carbon dioxide. One was a solution of CO_2 in distilled water, others were aqueous extracts from soils both poor and rich in organic matter and therefore in CO_2. It was shown that the leaves absorbed effective amounts of CO_2 together with the water, especially from soils rich in organic matter, and the suggestion is made that much of the CO_2 taking part in photosynthesis enters the leaves along with the moisture in the soil from which they both arise.

990. MOSHKOV, B. S. 612.014.44
Minimum intervals of darkness and light to induce flowering in short day plants.
C.R. Acad. Sci. U.R.S.S., 1939, **22**: 456-9, bibl. 1.
The treatments given to *Perilla ocymoides* were control, i.e. 12-hour day, and (1) 3 hours light followed by 21 hours darkness, (2) 15 hours light and 9 hours darkness, (3) 3 hours light and 9 hours darkness, (4) 4 hours light and 20 hours darkness, (5) 16 hours light and 8 hours darkness, and (6) 4 hours light followed by 8 hours darkness. Treatments (2) and (4) resulted in fruit bearing, (1), (3), (5) and (6) in buds only. It is obvious that 8 hours of darkness, whether following 16 or 4 hours of light, are insufficient for full development and fruiting. At least 9 hours of darkness and 4 hours of light are essential, irrespective of the rest of the 24 hours.

991. MOSHKOV, B. S. 612.014.44: 581.14
Photoperiodic response of plants as determined by their ontogenesis.
C.R. Acad. Sci. U.R.S.S., 1939, **22**: 460-3, bibl. 4.
The author gives evidence from experiments with *Perilla nankinensis* that the age of a plant potently affects its ability to make use of optimum photoperiods.

992. MOSHKOV, B. S. 612.014.44
On the photoperiodic after-effect.
C.R. Acad. Sci. U.R.S.S., 1941, **31**: 699-701, bibl. 3.
Plants which by submission to short photoperiods have been brought into readiness to flower are still under the influence of this treatment while passing through the subsequent physiological processes and will eventually reproduce, even if submitted to conditions under which they would not ordinarily form fruits. This phenomenon is termed photoperiodic after-effect. The present author, basing his assertions on results of grafting experiments with the ornamental and oil *Perilla*, considers that Čajlachjan errs in stating that the flowering hormone is stored by the leaves and stem tissues. Moshkov's data indicate that "the photoperiodic after-effect is due to those ontogenetic changes which are taking place in the leaves when they are under optimal photoperiodic conditions and which alter their influence on the development of plants. The subsequent return to vegetation is due to the formation of new leaves differing in their development from the first ones".

993. ČAÏLACHJAN, M. H. 612.014.44: 632.191
Photoperiodism of chlorotic plants.
C.R. Acad. Sci. U.R.S.S., 1941, **31**: 945-8, bibl. 13.
Experiments were made at the Timiriazev Institute of Plant Physiology with soya and millet. Those with millet are described here. Long and short day treatments were applied to green and chlorotic plants. Despite greatly decreased chlorophyll content in their leaves, chlorotic millet plants were just as responsive to photoperiod as were green plants and kept pace with the latter when development was hastened by optimum day length.

994. Sivori, E., and Went, F. W.
612.014.44: 631.586
Photoperiodicity of *Baeria chrysostoma*.
Bot. Gaz., 1944, **105**: 321-9, bibl. 13.
A study of photoperiodicity in a Californian desert annual.

995. Čaĭlachjan, M. H., and Zhdanova, L. P.
612.014.44: 581.144.2
Tuber formation as controlled by photoperiod and pruning.
C.R. Acad. Sci. U.R.S.S., 1941, **32**: 156-60, bibl. 12.
Experimental material consisted of Jerusalem artichoke and *Ullucus tuberosus*.

996. Hamner, K. C., and Parks, R. Q.
577.16: 612.014.44
Effect of light intensity on ascorbic acid content of turnip greens.
J. Amer. Soc. Agron., 1944, **36**: 269-73, bibl. 7.
A quantitative relationship, almost identical in old and young leaves, is shown to exist between light intensity and ascorbic acid level in turnip tops. Variations in ascorbic acid content of turnip greens cannot be accounted for on the basis of variations in temperature, in mineral supply and in relative humidity, but light intensities just prior to harvest play an important part in determining ascorbic acid level. The investigation was made at the U.S. Plant, Soil and Nutrition Laboratory, Ithaca.

Growth substances.

997. Thimann, K. V. 577.15.04
Growth hormones in plants.
Smithsonian Report for 1941, pp. 393-400, bibl. 13.
The author gives a brief but clear account of the progress of discovery with regard to the rôle and possible use of growth hormones in plants. He selects as a suitable starting point the investigations of Paál in Hungary in 1919 on the response of certain seedlings, especially oats, to light. Paál confirmed Boysen Jensen's finding that if the tip of a seedling is removed its sensitivity to light—as shown by the curving of the coleoptile towards light—is lost, but that, if the tip is merely replaced, its sensitivity returns. He also found that if the tip is replaced a little on one side the side on which it rests grows more than the opposite side, so that the plant curves. He deduced that the growth of the shoot was controlled by a growth substance produced by the tip. Next Went discovered that this substance could be diffused into jelly of agar or gelatin and retain its power to hasten growth. It was thought that the curvatures caused by asymmetric application were probably related to those due to light and gravity. Cholodny suggested and proved that all such curvatures were due to a displacement of the hormone within the plant, more going to the lower side when the plant is placed horizontal or to the shaded side when exposed to a one-sided source of light. Chemical work showed that the substance was present in comparatively large quantities in some bacteria and fungi and in human urine. Thimann investigated its distribution in the plant and found it to exist mainly in growing buds and young leaves. He found that if he replaced the growing terminal bud by auxins the side buds did not begin to grow out—as they would normally do on removal of the growing point—but remained inhibited. In other words auxin elicits different responses from different plant parts. Van der Lek and Went investigated the part played by hormones in root formation. Went and Thimann found that the richest source of these root-promoting hormones were the same as those of the growth-promoting hormones previously examined. One of them, indoleacetic acid, was synthesized. It was found that the effects on the rooting of cuttings vary considerably and in some cases are insignificant. Among the factors concerned in such difficult plants as Canadian hemlock and blue spruce are 1) the concentration and mode of application of the growth substance, (2) the age of the plant—it must be young, (3) the presence or absence of certain other substances, thus sometimes the addition of sugar, vitamin B_1, etc., is also necessary, (4) the type of shoot, thus in some conifers the side shoots will root readily, the apical shoot very reluctantly. Finally the different response of different layers of the same organ is noticeable, e.g. between the outer and inner layers of a stem. All these phenomena, which are gradually being revealed, are of the utmost importance to the study of the phenomenon of growth in general.

998. Gavrilov, K. I. 577.15.04: 581.192
On the dynamics of growth-substances of the group B in plants.
C.R. Acad. Sci. U.R.S.S., 1939, **22**: 365-9, bibl. 9.
Trials with lime, poplar, elm, lilac and ash by the Perm State Medical Institute showed that bios substances are present in large amounts in buds and leaves of these plants and that the amounts vary according to the stage of growth, temperature and radiation. Flower buds contain appreciably higher amounts than other parts of the plant.

999. Cholodnyj, N. G., and Gorbovsky, A. G.
581.12: 177.11.04
Influence of β-indole-acetic acid upon photosynthesis.
C.R. Acad. Sci. U.R.S.S., 1939, **22**: 452-5, bibl. 3.
Immersion of leaves of a number of plants, lilac, poplar, hemp, hydrangea, jasmine, etc., in a 1: 1,000 heteroauxin solution resulted in a temporary increase in photosynthetic activity. If, however, this treatment was continued more than a few, say, 7 hours, in some cases photosynthesis fell to subnormal. Immersion in 1: 100 solutions did not appear to affect photosynthesis.

1000. Sweeney, B. M. 577.15.04
The effect of auxin on protoplasmic streaming in root hairs of *Avena*.
Amer. J. Bot., 1944, **31**: 78-80, bibl. 8.
Auxin was found at Harvard University to accelerate protoplasmic streaming in root hairs, the optimum concentration of indole-3-acetic acid being 10^{-4} to 10^{-5} mg. per litre.

1001. Čaĭlachjan, M. H. 577.17: 581.14.035: 581.145
The movement of flower-promoting hormones along various plant organs. I. Movement along the leaf. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 159-62.
Plants of *Perilla ocymoides* and *P. nankinensis* were used in the experiments. It is concluded that the hormones which are formed in leaves exposed to a reduced period of daylight are able to pass from them to the flowering shoots not only along the veins but by way of the leaf parenchyma; and that when the main vein of a leaf is cut, only the nutrients which are required for the vegetative growth of shoots and the formation of dry matter are hindered in their passage from the leaves where they are formed.

1002. Čaĭlachjan, M. H. 577.15.04: 581.145.1
Translocation of flowering hormones in the plant as affected by temperature and narcotics.
C.R. Acad. Sci. U.R.S.S., 1941, **31**: 949-52, bibl. 6.
Experiments with *Perilla nankinensis* at the Timiriazev Institute lead the author to conclude that the living cells of plant tissues take an active part in transmitting photoperiodic influence from the leaves to the growing points and that the movement of flowering hormones through a certain organ of the plant depends on the activity of its living tissues in that organ. This movement is affected by temperature and by the treatment of the tissues with ether or chloroform.

1003. Zimmerman, P. W., Hitchcock, A. E., and Harvill, E. K. 577.15.04
Xylenoxy growth substances.
Contr. Boyce Thompson Inst., 1944, **13**: 273-80, bibl. 5.
Fourteen xylenoxy acids when applied to plants as aerosols,

vapours, sprays or in lanolin induced variable responses in cell elongation or formative effects or both. The effects were demonstrated in the form of leaves differing from normal in size, shape, pattern, texture and venation, resembling in fact the modifications of some virus diseases but, unlike them, not transmissible by inoculation or grafting. After removal of the chemical influence the plants reverted to normal. The physiological activity of the substances seems to be related to the kind, number and position of the substituted groups in the benzene ring. Linkage between the alpha carbon atom of the acid and the oxygen of the xylenoxy group appeared to be necessary for activity of the molecule.

1004. BERGER, J., AND AVERY, G. S., Jr. 577.15.04
Glutamic and isocitric acid dehydrogenases in the *Avena* coleoptile and the effect of auxins on these enzymes.
Amer. J. Bot., 1944, **31**: 11-8, bibl. 10.
Phytohormones may exert their growth effects on or in enzyme systems. The object of the present study at Connecticut College has been to isolate dehydrogenases in cell-free extracts of the *Avena* coleoptile and to investigate *in vitro* the effect of addition of synthetic auxins in varying concentrations to these dehydrogenase systems. [From authors' summary.]

1005. GISIGER, L. 577.16: 631.8
Einfluss von Vitamin B_1 auf Wachstum und Ertrag verschiedener Kulturpflanzen. **(The effect of vitamin B_1 on growth and cropping of different cultivated plants.)** [French summary 11 l.]
Landw. Jb. Schweiz, 1944, **58**: 54-66, bibl. 7.
The addition of vitamin B_1 had no effect on the growth of sunflowers, maize, wheat, flax and haricot beans in pot experiments. This indicates that the plants can elaborate the quantities necessary for their growth. There is no necessity for its presence in fertilizers.

Technique.

1006. BOSE, A. C. 581.192
An improved method of locating tannins in plant sections.
Curr. Sci., 1943, **12**: 327-9, bibl. 8.
Folin Denis Reagent (F.D.R.) was used to advantage at the Jute Agricultural Research Laboratories, Dacca, for detecting tannins in plant sections.

1007. WHITING, A. G., AND MITCHELL, J. W. 578.087
A method of numerically evaluating areas of plant tissue.
Bot. Gaz., 1944, **105**: 405-8.
Work at Beltsville, Md is summarized as follows: "1. A method of measuring areas of tissues in numbers of plants is described. Sections of the plant were cut with the aid of a freezing microtome, stained, and mounted in glycerin jelly. By means of a projection microscope, an image of the section was thrown on a screen, and areas of tissue symmetrical in outline were calculated from linear measurements, while irregular areas were traced on cellulose acetate, inked, and measured by means of an area photometer. 2. This method is of value in accurately determining the areas or volumes of specific tissues associated with specific functions, such as rubber storage in guayule."

1008. LINDNER, R. C. 581.192
Rapid analytical methods for some of the more common inorganic constituents of plant tissues.
Plant Physiol., 1944, **19**: 76-89, bibl. 7.
Rapid colorimetric procedures for the determination of nitrogen, phosphorus, and magnesium, and turbidimetric procedures for the determination of potassium and calcium in the same sample of plant tissues are presented. [Author's summary.]

1009. WOLF, B. 581.192
Rapid photometric determination of total nitrogen, phosphorus, and potassium in plant material.
Industr. Engng Chem. (*Analytical Edition*), 1944, **16**: 121-3, bibl. 9.
The analytical method presented consists in ashing the plant material by means of sulphuric acid and hydrogen peroxide and testing for nitrogen, phosphorus and potassium on separate aliquots of the ash extract by means of a photoelectric colorimeter. This rapid determination of the 3 elements was found to give sufficient accuracy for many routine purposes.

1010. NICHOLS, M. L., AND ROGERS, L. H. 581.192: 547.25.77
Determination of small amounts of molybdenum in plants and soils.
Industr. Engng Chem. (*Analytical Edition*), 1944, **16**: 137-40, bibl. 24.
From a consideration of the 3 methods the authors conclude that for the ordinary laboratory the colorimetric procedure is superior to the spectrographic and polarographic methods, if 1 g. or more of soil or 10 g. or more of air-dried plant material are available. If, however, only smaller amounts are available, the spectrographic method is preferable.

1011. ARNON, D. I., AND HOAGLAND, D. R. 578.084: 631.8
The investigation of plant nutrition by artificial culture methods.
Biol. Rev., 1944, **19**: 55-67, bibl. 125.
This review presents a general survey of artificial culture methods employed in the investigation of plant nutrition. Several types are described, including liquid-culture methods and those which depend on a solid inert medium. The advantages of artificial culture procedures for growing plants are pointed out, as one means of studying soil/plant interrelations, as well as various questions in plant physiology and plant biochemistry. These methods have been indispensable in the study of the chemical elements essential to the growth of higher plants, especially of those elements needed in minute quantities. The techniques of artificial culture are also of great value for the investigation of the absorption of ions by roots. These techniques serve likewise for inquiries into the interreactions of climatic conditions and mineral nutrients. Among other topics considered are the application of artificial culture methods to researches on the functions in plant metabolism of inorganic nutrients, the role of colloids in absorption of ions, horticultural and agronomical problems, and commercial production of crops. [Authors' summary.]

1012. PEPKOWITZ, L. P., AND SHIVE, J. W. 631.433
The importance of oxygen in the nutrient substrate for plants — ion absorption.
Soil Sci., 1944, **57**: 143-54, bibl. 12.
A method and apparatus are described from the New Jersey Experiment Station for the direct determination of ion absorption by plants at approximately maintained dissolved oxygen tensions in the substrate by periodic analysis of the nutrient solution without disturbing the plants. Vigorous activity of the plants (tomatoes and soybeans) on clear dry days accelerated the absorption of nutrient ions, especially of calcium and phosphorus and to a much less degree of potassium.

1013. LEONARD, O. A. 581.144.2: 631.517
Use of root pressures in determining injury to roots by cultivation.
Plant Physiol., 1944, **19**: 157-63, bibl. 2.
A method of measuring injury (comparatively) to roots by cultivation has been described from the Mississippi Experiment Station. The method involves using changes in positive root pressures before and after cultivation, with a standardized time interval of two minutes between readings. The results are calculated as percentage changes in root pressure. [From author's summary.]

1014. McGONAGLE, M. P. 635.656: 631.847.2
Cultures of excised leguminous roots.
Nature, 1944, **153**: 528-9.
In this work (now interrupted) carried out at Glasgow University, attempts to induce the formation of nodules on excised leguminous roots (*Pisum*) were unsuccessful, though excellent rootgrowth was obtained in the medium used (Bonner's), which had been inoculated with the appropriate nodule bacteria. Good nodulation was obtained when whole plants were grown in the Bonner medium.

1015. STEINBERG, R. A. 631.8: 585.472
Use of *Lemna* [duckweed] as test organism.
Chron. bot., 1943, **7**: 420.
The use of *Lemna* as a test organism for nutritional investigations is re-emphasized, but further study of the optimum growing conditions is required.

1016. LUNDEGÅRDH, H., AND STENLID, G. 576.32
Physico-chemical properties of the surface of growing plant cells.
Nature, 1944, **153**: 618-9, bibl. 7.
Spectro-chemical examination of the exudate of growing roots of wheat seedlings in distilled water indicated that among the substances present were adenosine phosphoric acid (1-3 PO_4) and a flavanone, probably a 3′, 4′ dioxyflavanone. The implications of these discoveries are discussed.

1017. ANON. 631.588.1: 631.544
Elektrisk vår i växthus och trädgårdar. Våren börjar 14 dar tidigare och hösten slutar vid jultiden. **(Springtime switched on in greenhouse and market garden.) Spring starts a fortnight earlier and autumn ends at Christmas.**
Joel, 1939, Nr. 1, pp. 11-3.
NILSSON, G.
Växterna trivas i elljus. **(Plants thrive on electric light.)**
Joel, 1938, Nr. 4, pp. 58-60.
Two Swedish papers on the application of electricity to horticultural plants in frame and greenhouse. [Translations available on loan.]

1018. CLYDE, A. W. 631.3.083/084
Using the tractor efficiently.
Bull. Pa agric. Exp. Stat. **441**, 1943, pp. 24, bibl. 9.
The essential maintenance of a tractor is considered under the following headings: mechanical condition, fuels and compression, oils, traction, hitches, care of tyres.

1019. [FELBER, I. M., AND GARDNER, V. R.] 547.458.81
Methylcellulose.
Ill. Hort., 1944, **33**: 2: 4-5.
Some agricultural uses of methylcellulose, which has lately been the subject of experiment at the Michigan Experiment Station, are described. A 1% solution of a certain type of methylcellulose when poured on to sand or a sandy soil reduces the rate of water evaporation, delays the wilting of plants and reduces the quantity of water required by the plant to produce a pound of dry matter. It may also have some hitherto unsuspected uses in spraying, or, as it forms a tough invisible film, as a coating for fruit, vegetables or even flowers. It is stable, non-toxic and manufactured in many different forms differing in varying degrees in their properties.

Nutrition.

1020. GEERING, J. 631.8: 631.432
Lysimeter-Versuche. **(Lysimeter trials.)** [French summary 1 p.]
Landw. Jb. Schweiz, 1943, **57**: 107-82.
Drainage losses of nutrients under Swiss conditions have been studied at the Agricultural Experiment Station of Zürich-Oerlikon since 1922. The original number of 12 lysimeters was later on increased to two sets of a dozen each and a third dozen was installed at Maran in 1934. Until 1929 the trials were conducted by the late Director of the Station, Dr. A. Volkart, and have since been continued by the present Director, Dr. F. T. Wahlen. Drainage water tests in aliquot parts of the total flow were made, as a rule, once a fortnight or once a month. In the course of the investigation the following problems were studied: Leaching of nutrients in clean-cultivated, planted and planted +fertilized soils; the leaching of chlorine after autumn and spring manuring; utilization of an autumn application of nitrogen; the leaching of lime after liming; the leaching of nitrogen after an application of stable manure; the influence of fertilizer applications on nitrogen fixation and nitrification in the soil; the production of nutrients due to the disintegration of serpentin and Bünden slate. The results obtained are described in detail in the text and in some 20 pages of tables. The following is a translation of some passages where the author summarizes the most significant conclusions reached: (1) *Phosphoric acid* is not subject to leaching for all practical purposes and may be supplied beyond momentary needs, if an opportunity arises. (2) *Nitrogen* in a mineral or easily mineralized form (nitrite, ammonia, urea, etc.) will not be fixed by the soil without special measures. The application of soluble nitrogen should, therefore, be confined to top dressing. If supplied as humus, stable manure, etc., the nitrogen is retained in the soil for a longer period, but is slowly utilized. Loosening of the soil enhances the mobilization of fixed nitrogen. In periods of fallow (and partial fallow) nitrification is great and the danger of great nitrogen losses is considerable. These sources of loss can be put to good use by catch crops. (3) With normal applications *potash* will be well retained in the soil. Continued application of overdoses, however, will lead to considerable loss of potash. (4) *Lime* plays the important role of regulating the acid-base balance in the soil. Intensive soil cultivation and utilization are generally associated with high losses of lime. The lime content of the majority of Swiss soils is high compared with its needs.

1021. FAUVEL, J. H. 631.544 +631.589
La pratique de la stimulation et du forçage des plantes. **(Various methods of accelerating plant growth.)**
Rev. Hort. Agric. Afr. N., 1941, **45**: 91-6, 123-35; **46**: 12-23.
A review of the more recent results obtained in the stimulation of plant growth. The following subjects are covered. The role of the minor elements, of radioactive elements and of bacteria; electrical soil heating; stimulation by increase of carbon dioxide in the atmosphere of greenhouses, various methods being briefly mentioned, and by increasing the CO_2 of the soil; in both these gassing experiments the best results seem to be obtained when the soil is electrically heated. The commercial forcing of plants is also discussed. The necessity for a rest period before forcing is pointed out and the various uses of temperature and light control are examined. Special attention is given to the Russian work on vernalization (with acknowledgments to the Imperial Agricultural Bureaux publications which are extensively quoted). Forcing methods using glycol chlorohydrins, thiourea and other chemicals, various gases and synthetic growth substances receive mention as do the methods whereby the chromosomes are artificially increased by means of colchicine and other substances.

1022. RICHARDS, F. J. 631.8: 581.13
A critical examination of new theories of the metabolism of major nutritive elements in plants.
Ann. Bot. Lond., 1944, **8**: 43-55, bibl. 9.
The theories examined are those of Mason and Phillis (*Ann. Bot. Lond.*, 1942, 6: 443, 455, 469 and 1943, 7: 147) on such aspects of plant nutrition as apolar adsorption, and water content. The author concludes that the theories rest on inadequate experimental foundations.

1023. GERICKE, S. 631.85
Wird die Stallmist-Phosphorsäure besser verwertet? **(The utilization of the phosphoric acid in stable manure.)**
Forschungsdienst, 1943, **16**: 283-91, bibl. 37.
New experiments at Berlin-Dahlem show that the phosphoric acid contained in and applied as stable manure is no better utilized than that applied as mineral fertilizer.

1024. INSTITUTE OF GRAIN HUSBANDRY OF THE NON-CHERNOZEM ZONE, MOSCOW. 581.11: 631.547
The utilization of plant nutrients. [Russian.]
Publ. Inst. Grain Husbandry **11**, 1941, pp. 136.
The purpose of this study was to find how manurial elements may be most profitably utilized by plants. Manures were given to plants in various quantities, at different stages of growth, and containing various amounts of the nutrient elements. It was found that the maximum quantities of manures were taken up by plants and their utilization was most effective when they were applied with due regard to the quantitative requirements of the plants at each successive stage of growth. Two such stages in particular were identified: the critical stage, which occurred in the early period of growth, and a later stage when manures exerted their maximum effect. The effect of an insufficient quantity of nutrients, or a disproportion among the constituent elements during the first-mentioned stage could never be obliterated by subsequent treatment. It was found possible to modify morphological characteristics of the plants by manurial treatment. Experiment showed that when the supply of nutrients was constant, a stage was reached when the plant's ability to absorb them diminished for a time. When the nutrients were made available at discrete intervals, this obstacle was overcome and the total quantity which the plant could take up was consequently increased. The plants used were barley, millet, peas, and chicory.

1025. WYND, F. L. 632.19: 577.16
The concept of cellular and organismic functions of the vitamins.
Chron. bot., 1943, **7**: 424-6, bibl. 9.
In order to avoid confusing deficiency symptoms with fundamental reactions, it is necessary in many instances to study the behaviour of vitamins in protoplasm itself, and to attempt to define their individual and specific reactions. A more thorough knowledge of the cellular activities of vitamins in all probability would show many similarities between plants and animals which would lead to a solution of the perplexing problems which now confront the student of vitamin physiology. [From author's summary.]

1026. SCHMITT, L., AND HASPER, E. 631.8
Wirkstoffe und biologisch-dynamische Wirtschaftsweise. **(Stimulants and the "biological-dynamic" method.)**
Bodenk. PflErnähr., 1942, **30**: 65-95, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. pp. 1-2.
A number of drug extracts recommended as fertilizers by the biological-dynamic school were tested extensively at the Agricultural Experiment Station, Darmstadt. No effect of any so-called "bios"-substances could be discovered, but it was shown that equivalent amounts of a mineral NPK fertilizer gave better results than an application of the drugs.

1027. KUNIN, R., AND ROBBINS, W. R. 635.64: 631.416.7
The relative availability to plants of exchangeable calcium from soil separates of sand, silt, and clay.
Soil Sci., 1944, **57**: 137-42, bibl. 11.
In this experiment at the New Jersey Experiment Station the absorption of calcium by tomato plants from sand particles was almost as rapid as from clay or silt and was apparently by means of processes other than contact exchange. Thus soil particles large enough to be classed as sand may be an important source of available calcium for plants.

1028. EPIMOV, N. I. 581.144/2: 631.8
Scientific notes—the effect of various nutrients on the growth of root terminals of transplanted lime *(Tilia)* trees. [Russian.]
Sovetskaja Botanika, 1940, No. 1, pp. 71-5.
Limes (*Tilia*), between 15 and 20 years old, were transplanted. The author then studied the root system of each at its periphery in order to find what kinds of soil and mineral nutrients will encourage the regeneration of the roots and stimulate their growth. He found that the most rapid growth of the roots in length, their most vigorous and frequent branching, and the thickest roots were to be found in composts and soils rich in humus. Among the several nutrient solutions which were tried, the characteristics just referred to were most highly developed in solutions of magnesium sulphate and potassium phosphate.

1029. PIPER, C. S., AND WALKLEY, A. 581.192: 546.56+546.47+546.711
Copper, zinc and manganese in some plants of agricultural interest.
J. Coun. sci. industr. Res. Aust., 1943, **16**: 217-34, bibl. 36.
The copper, zinc and manganese contents of 89 samples of Algerian oats and the copper and zinc contents of a number of other agricultural plants and weeds were determined at the Waite Agricultural Institute. The results of the analyses, carried out on 3 different dates, are presented in tables, which show among many other things that legumes were richer than cereals and grasses in both zinc and copper and that the variation of the zinc and copper content due to species in a range of plants on the same soil was greater than that of oats growing on widely differing soils.

Noted.

1030. RAMANUJAM, S. 631.523: 575.1(54)
Genetical research as applied to plant breeding in post-war India.
Curr. Sci., 1944, **13**: 63-5.
Present position and suggestions.

COCHRAN, W. G. 519: 633/635
Some developments in statistics.
Chron. bot., 1943, **7**: 383-6.

SKIRM, G. W. 578.084
Embryo culturing as an aid to plant breeding.
J. Hered., 1942, **33**: 211-5, bibl. 22.

ÅBERG, E. 585.1: 633/635
Problems in the classification of cultivated plants.
Chron. bot., 1943, **7**: 375-8.

HOPP, H. 581.9
Multiple measures for distinguishing closely related plant forms.
Chron. bot., 1943, **7**: 402-3.

PRESTON, N. D. 633.5: 581.824.2
The fine structure of the walls of phloem fibres.
Chron. bot., 1943, **7**: 414-6.

BREWER, G. E. F., AND GODAR, E. 581.144.4
Buffer values of the leaves of some plants.
Plant Physiol., 1944, **19**: 164-9, bibl. 9.

VLAMIS, J., AND DAVIS, A. R. 581.1
Effects of oxygen tension on certain physiological responses of rice, barley and tomato.
Plant Physiol., 1944, **19**: 33-51, bibl. 22.

CRAFTS, A. S. 581.11
Osmosis and osmotic pressure.
Chron. bot., 1943, **7**: 386-8.

ROSENE, H. F. 581.144.2
Glass potometers for studies of absorption and exudation by excised roots.
Plant Physiol., 1944, **19**: 170-2.
Description and diagrams.

LANG, A. 612.014.44: 633.88
Übertragung der Hemmwirkung der Blätter auf die Blütenbildung bei *Hyoscyamus niger* in Kurztagbedingungen durch Pfropfung. **(The transmission by grafting of the checking effect of leaves on flower formation under short-day conditions in *Hyoscyamus niger*.)**
Naturwiss., 1942, pp. 590-1, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 6.

STEEMAN NIELSEN, E. 581.12: 612.014.44
Der Mechanismus der Photosynthese. Versuche mit *Fucus serratus* und anderen Submersen. **(The mechanism of photosynthesis. Experiments with *Fucus serratus* and other submerged plants.)**
Danske bot. Ark., 1942, Vol. **11**, Nr. 2, pp. 95, dkr. 6.-, from review *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 5.

RAKITIN, J. V., AND JARKOVAJA, L. M. 577.15.04: 634.8
Distribution of bios in leaf of pueraria and vine.
C.R. Acad. Sci. U.R.S.S., 1939, **22**: 523-6, bibl. 6.

MELCHERS, G., AND LANG, A. 612.014.44: 633.88
Auslösung von Blütenbildung bei der Langtagpflanze *Hyoscyamus niger* in Kurztagbedingungen durch Infiltration der Blätter mit Zuckerlösungen. **(The induction of flower formation in the long-day plant *Hyoscyamus niger* under short-day conditions by means of injecting the leaves with sugar solutions.)**
Naturwiss., 1942, pp. 589-90, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 5-6.

DORFMÜLLER, W. 577.15.04
Ergebnisse und Probleme der Wuchsstofforschung. **(Research on growth substances, its problems and results.)**
Dtsch. Heilpfl., 1943, **9**: 105-10, bibl. 45.

AVERY, G. S., JR., BERGER, J., AND SHALUCHA, B. 577.15.04
Extent of auxin-precursor hydrolysis in different *Avena* assay methods.
Bot. Gaz., 1944, **105**: 364-9, bibl. 11.

HERRMANN, R. 631.416.4
Schnellmethoden zur Bestimmung des pflanzenaufnehmbaren Kaliums im Boden. **(Quick methods of determining the available potassium in the soil.)**
Forschungsdienst, 1943, **16**: 239-44, bibl. 16.

SIDERIS, C. P. 545.81: 581.192
Adaptation of an indirect method for potassium to the photoelectric colorimeter.
Industr. Engng Chem. (*Analytical Edition*), 1942, **14**: 821, bibl. 5.

PALAWEEW, T. 631.414: 581.14
Chemisch-physikalische und physiologische Untersuchungen an organischen, anorganischen und organo-mineralischen Kolloiden in ihrem Einfluss auf Boden und Pflanze. **(Chemico-physical and physiological investigations on the influence of inorganic and organic-mineral colloids upon soil and plant.)**
Kühn-Arch., 1942, **56**: 173-214, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 1.

ALLEN, H. R., AND GAULT, L. 631.813
Factors affecting determination of acid- and base-forming quality of fertilizers.
J. Ass. off. agric. Chem., Wash., 1944, **27**: 171-7.

ACHARYA, C. N. 631.875
Preparation of compost manure from town wastes.
Misc. Bull. imp. Coun. agric. Res., India, **60**, 1944, pp. 10.

TREE FRUITS, DECIDUOUS.

General.

031. SOVIET HOME SERVICE (WIRELESS). 634.1/8-1.521
Michurin Institute's fruit experiments. [Russian.]
Broadcast 15.00, 17.5.44 (M.I., I.O.).
he selection section of the Michurin Institute is continuing s work on fruit. Some 30,000 hybrid varieties of apples, ears, cherries, plums, apricots and grapes are being raised. hese plants, which stood up to exceptionally cold winters the years 1939 to 1942, will soon be bearing fruit. The nstitute is proposing to distribute over 200,000 fruit trees his year.

032. AUBERT, T., AND LUGEON, A. 634.1/8
Arboriculture fruitière moderne. **(Modern fruit growing.)**
Payot, Lausanne, 1944, pp. 350, 2nd ed., Fr. 7.-, from review *Schweiz. Z. Obst- u. Weinb.*, 1944, **53**: 206-7.
his second edition embodies the latest research carried out nce the book's first publication in 1941. For the pruning f standard trees the so-called Oeschberg method is advoated, which is now common practice in the German parts f Switzerland.

033. DE VILLIERS, G. D. B. 581.056: 634.1/8
Research on the influence of climate on deciduous fruit growing.
Chron. bot., 1943, **7**: 388-90.
fter a summary of more recently published data on the influence of climate on deciduous fruit growing in the western Cape Province, South Africa, a brief account is given of the climatic research carried out at the Agricultural Meteorological Observatory, which was erected at the Fruit Research Institute, Stellenbosch, in 1940, and its subclimatic stations in 12 of the major fruit growing districts. The object of this comprehensive climatic survey is defined as follows: "(1) To ascertain the diverse meteorological factors operative in the principal fruit growing areas. (2) To gauge the climatic suitability of these districts for the growing of different fruits. (3) To determine the precise climatic requirements of the different fruits and varieties. (4) To ascertain both beneficial and detrimental meteorological conditions influencing tree behaviour at any time in its annual life cycle. (5) To exploit favourable and dispose of unfavourable climatic conditions for growth. (6) To determine the most suitable areas for the drying of fruit. (7) To determine the varieties most resistant to delayed foliation so that they may be propagated and to obtain more resistant varieties by hybridization. (8) To determine more fully the most critical period in the annual life cycle of the fruit tree so that adverse climatic conditions may be ameliorated by remedial measures. (9) To be able to furnish fruit growers with the necessary information as regards the most suitable varieties for the different fruit growing areas and to advise them concerning the best orchard practices to follow under diverse climatic conditions." The annual life cycle of the Peregrine peach is given in the light of climate research and offered as an illustration of the work conducted at the Observatory.

1034. LACEY, J. W. 634.1/2: 581.145: 632.95
Progress in Palestine.
Gdnrs' Chron., 1944, **116**: 6-7.
A brief survey of some problems facing the agricultural and horticultural research worker in Palestine. One discovery which is of the greatest interest to fruitgrowers has been made at the Rehovoth Agricultural Research Station: The irregular dormancy habit shown by deciduous fruit trees in the middle East can be controlled by spraying with a mineral oil wash in winter. Trees treated in this manner were found to break into leaf and flower at the normal time in spring. Further observations showed that by timing the winter treatment at appropriate dates the period of maturity as well as size, colour and flavour of fruit could be controlled.

1035. SCHMID, G. 634.1/7
Zum Problem des geschlossenen Baumgartens. **(The concentration of fruit trees in orchards.)**
Schweiz. Z. Obst- u. Weinb., 1944, **53**: 70-4.
Particularly in central and eastern Switzerland single fruit trees have been planted haphazard over the countryside. Referring to the favourable results obtained with the transplanting of fruit trees on a big scale in the canton of Schwyz, the author urges that everywhere in Switzerland fruit trees, at least up to 20 years of age, should be concentrated in orchards.

Selection and varieties.

1036. W., H. 634.11-1.521
Von der Sortenwahl unter besonderer Berücksichtigung zürcherischer Verhältnisse. **(The selection of tree fruit varieties in the canton of Zürich.)**
Schweiz. Z. Obst- u. Weinb., 1944, **53**: 152-6.
Discussing a list of tree fruit varieties for different purposes, issued as an official recommendation in the canton of Zürich, the following apple varieties are named as locally showing particularly good keeping qualities: Jonathan, Freiherr von Berlepsch, Pariser Reinette and Glockenapfel.

1037. LUNDIN, Y. 634.1/2(485)
Meddelande om skördekontrollen år 1943. **(Harvest report for 1943.)**
Fruktodlaren, 1944, No. 3, pp. 87-9.
The secretary of the Swedish Pomological Society gives figures of apple, pear, plum and cherry crops in 1943. Specific data are presented for 31 apple varieties, 11 pear varieties and 4 plum varieties.

1038. LUNDIN, Y. 634.1/7(485)
Hemträdgårdens frukter och bär. **(Fruit varieties for the Swedish home garden.)**
Esseltes Göteborgsindustrier A.-B., Ser. *Svenska Hushållsböcker*, (no date), pp. 136, 4 kr., from review *Fruktodlaren*, 1944, Nr. 2, pp. 70-1.
The book is praised by the reviewer for its 124 excellent illustrations, 74 in colour, which show the characters of the varieties of tree fruits and soft fruit most suitable for Swedish conditions. The variety selection was made by the Government for the Swedish Pomological Society, whose secretary is the author of this book, in collaboration with horticultural advisers and fruit growers.

1039. HÜLPHERS, A. 634.11(485)
Något om hushållsfrukt. **(Apples for general use.)**
Fruktodlaren, 1944, Nr. 2, pp. 39-41.
The need for growing more apples for general use in Sweden to cut down imports is strongly stressed and figures are given to prove that the growing of such varieties as Boiken, Beauty of Kent, Belle de Boskoop, etc., is a paying proposition. A list of varieties which will supply the home market with good, not luxury, fruit from August to May is provided.

1040. NYQUIST, J. 634.11-1.521
Spässerudsäpplet. **(The Spässerud apple.)**
Fruktodlaren, 1944, Nr. 1, pp. 16-7.
Attention is drawn to a local apple variety, the Spässerud apple, grown in Vermland, Sweden, for which the following characters are claimed: exceptional frost resistance, great resistance to scab and other diseases, very long storage life of the fruit, which is classified as dessert grade II. A description of the variety is given.

1041. KIDSON, E. B. 634.11: 577.16
The vitamin C content of Nelson apples.
N.Z. J. Sci. Tech., 1943, **25**, Sec. B, pp. 134-6, bibl. 2.
Delicious showed the lowest (1·9-5·1 mg. per 100 g.) and Sturmer the highest (17·9-35·9 mg. per 100 g.) vitamin C content of 11 apple varieties tested at the Cawthron Institute, Nelson, N.Z. The figures relate to determinations of flesh and skin combined, the percentage after removal of the skin being lower.

1042. PFUND, M. C. 634.11: 641.5
The culinary quality of apples as determined by the use of New York State varieties.
Mem. Cornell agric. Exp. Stat. **225**, 1939, pp. 73, bibl. 19.
Thirteen varieties of apple were grouped by personal opinion rating for the following qualities:—flavour, texture, appearance when baked, appearance when made into sauce.

1043. BUCHTA, V. 634.13-1.55
A pear tree bearing two crops every season. [German.]
Schweiz. Z. Obst- u. Weinb., 1944, **53**: 142-3.
In a letter to the *Schweiz. Z. Obst- u. Weinb.* the Director of the Horticultural Experiment Station, Bratislava, Czechoslovakia, describes a pear tree in a private garden of the Waag Valley which bears two crops regularly every season. This remarkable phenomenon is reported to have been first observed between 1905 and 1910. Flowering occurs at the normal time and then again, in June or the beginning of July, in clusters at the tips of the branches. The two crops ripen at the beginning of September and the end of October respectively, the fruits of the first crop being bigger, better in taste and with fully developed seeds, while the seeds of the second crop are very small and empty. Scions were repeatedly grafted on other trees, and were found to retain their peculiarity. The origin of the tree is unknown. The phenomenon is discussed by the editor.

1044. DE WET, A. F. 634.13-1.521(68)
A list of pear varieties in cultivation in the Union of South Africa and their synonyms.
Sci. Bull. S. Afr. Dep. Agric. **101**, 1931, pp. 40, bibl. 18.
List of 135 varieties known in the Union in 1928. Details are given of the very numerous synonyms, of references in literature and of where illustrations may be found. [The Bureau regrets that it has only recently received this bulletin.]

1045. EDITOR, FRUKTODLAREN. 634.22(485)
Ett plommonsortiment. **(Plum varieties for Sweden.)**
Fruktodlaren, 1944, Nr. 2, pp. 41-5.
Illustrations and brief descriptions of 9 plum varieties, compiled for the Swedish Pomological Society. The list is recommended in the planting of new orchards.

1046. LESLEY, J. W. 634.25
New peach varieties for a sub-tropical climate.
Calif. Citrogr., 1944, **29**: 138.
Improved types of peaches which require only a short rest period and are therefore suitable for a sub-tropical climate such as California, where the ordinary peaches fail to bear well, are being evolved and the following recently introduced

varieties are recommended for trial. Robin, developed by the Armstrong Nurseries, Ontario, Calif.; Redbird, by the same firm, is superior in size and quality to the well-known Babcock peach; Weldon originating at the Chaffey Junior College is a large fruited, mild-flavoured, yellow freestone, ripening in July. These are earlies. The mid-season group includes Hermosa, a white-fleshed freestone; and Sunglow, a yellow-fleshed freestone, both developed from J. H. Hale × Bolivar Cling at the California Citrus Experiment Station. Fontana, a late-mid-season, non-melting, yellow-fleshed cling suitable for canning, was brought out by Mr. G. P. Weldon of Chaffey Junior College, Ontario. No new late-maturing freestone has been released.

1047. VELDHUIS, M. K., AND NEUBERT, A. M. 634.25: 664.85.25.036.5
Freestone peach varieties for canning in Washington.
Fruit Prod. J., 1944, **23**: 229-33, bibl. 4, being *Contr. agric. chem. Res. Div.* **592** and *Sci. Pap. St. Coll. Wash.* **122**.

Large-scale trials, extending in most cases over at least 3 seasons, were conducted, at Pullman, both at the U.S. Department of Agriculture Fruit and Vegetable Laboratory and at the Washington Agricultural Experiment Station, to determine the suitability of some 40 freestone peach varieties for canning. The tables present data on harvest results in 1940, number of years canned, pit, fruit colour and texture, and general comment is also made. The varieties Elberta, Gold Medal, Ibes No. 1 (a seedling found in the plantings at the Irrigation Branch Experiment Station) and early Elberta proved to be most suitable varieties. Further, a list of varieties is given, which are not quite so desirable, but would be useful to the industry as lengthening the period of canning. The method of evaluation is explained in detail.

1048. CALDWELL, J. S., AND CULPEPPER, C. W. 634.25: 664.85.25.036.5
Further studies in utilization of Eastern freestone peaches. I. Studies of canning quality.
Fruit Prod. J., 1944, **23**: 170-3, 186-7, bibl. 10.

The canning quality of 48 freestone peach varieties was studied at Beltsville, Md. The varieties ranked as "best" are: Canadian Queen, Early Elberta, July Elberta, Lemon Cling, Phillips Cling. 15 more varieties are classed as "very good". Others were found to require further tests at different localities.

1049. CULPEPPER, C. W., AND CALDWELL, J. S. 634.25: 664.85.25
Further studies in utilization of Eastern freestone peaches. II. Studies of quality for preserve making.
Fruit Prod. J., 1944, **23**: 200-5.

After 6 months storage in the dark at room temperature preserves made from 60 peach varieties, chiefly of the yellow, melting-fleshed, dessert type, were graded for colour, texture, flavour, degree of disintegration of fruit, and consistency. The following varieties ranked in the top group as best or excellent: Early Elberta, Eclipse, Globe Ideal, Massasoit, Muir, Oriole, Rio Oso Gem, Summercrest, Sunbeam, Sunhigh, Vedette and Veteran. A comparison with results of other trials, conducted simultaneously, showed that as a rule any one variety is especially suitable for not more than one purpose only. The following varieties, constituting an exception to this rule, were rated highly in different trials for preserving, canning and dehydrating: Canadian Queen, Early Elberta, Eclipse, Fertile Hale, Globe, Halehaven, Kalamazoo, Massasoit, Rio Oso Gem, Sunhigh, South Haven and Viceroy. The experiments were carried out in continuation of earlier work (*Circ. U.S. Dep. Agric.* 375, 1935, pp. 21, bibl. 17; *H.A.*, 6: 257) and were chiefly concerned with varieties which had not previously been studied.

1050. MALAN, E. F. 634.63
Olive culture in South Africa.
Fmg S. Afr., 1944, **19**: 29-31.

Olive cultivation trials, carried out at the College of Agriculture, Potchefstroom, and observations of olive growing in other parts of the Union led the author to make the following recommendations: (1) Wide areas would be suitable for olive growing, but, in view of the low price of imported olives, cultivation should be restricted to soils which are not fit for most other crops and production in excess of local demands should be discouraged. (2) Wild olive trees should be topworked systematically (*a*) by grafting or by budding of young shoots after cutting back the tree in the moist coastal areas, (*b*) by budding during the rainy season in the drier parts of the interior. The author found budding more successful than grafting also in the Barkley West district. The budding and grafting techniques recommended are described. Further instructions refer to climate and soil requirements, varieties, planting, pruning and propagation.

Propagation and rootstocks.

1051. UPSHALL, W. H. 634.1/2-1.541
Orchard grafting.
Bull. Ontario Dep. Agric. **439**, 1944, pp. 22, bibl. 3.

This is a bulletin for fruit growers and describes clearly the re-working of apples and pears by the cleft-grafting method of topworking and the stub- and oblique side-grafting method of frameworking. Budding young trees in orchards is also described. The importance of subsequent care of grafted trees is stressed and the repair of injuries due to bridge-grafting is detailed.

R.J.G.

1052. TRENKLE, R. 634.1-1.541.11
Hochstamm oder Niederstamm beim Kernobst. **(Standard or half standard trees for pome fruit.)**
Dtsch. Obstbau, 1943, **58**: 113-5, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 10.

The author recommends that under German conditions half-standard pome fruit trees on seedlings should be planted rather than bush trees on vigorous or fairly vigorous Malling rootstocks or quinces. The height of the stem suggested is 0·70-1·00 m.

1053. HÜLSMANN, B. 634.11-1.541.11
Veredlungsversuche auf verschieden stark bedornten Abrissen der Apfelunterlage Ketziner Ideal. **(The budding of rooted shoots of the apple rootstock Ketziner Ideal showing various degrees of thorniness.)**
Gartenbauwiss., 1942, **17**: 171-5.

It is well known that some of the rooted shoots and the one-year-old shoots of the apple rootstock M. XVI (Ketziner Ideal) are very thorny, whereas others are not. The attempt was therefore made at Berlin University to determine whether M. XVI is a true clone or whether it is composed of two closely related strains. The results of budding tests with a number of varieties over a period of years showed that the degree of thorniness, exhibited by the mother plant in its youth stage, had no permanent effect, but that the state of the rootstock at the time of budding had some influence on the later development of the tree.

1054. TUKEY, H. B. 634.11-1.546-1.541.11
The possibilities for small and early-bearing orchard trees.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 206-14.

There are three ways in which small, early bearing fruit trees may be produced. Varieties can be planted which characteristically produce small and early fruiting trees, e.g. Cortland and Gallia apple varieties. Or technique can be used promoting early fruiting, e.g. planting in soil of low

fertility and giving or withholding nutritional elements at will. Or, finally, dwarfing rootstocks can be used, and attention is here drawn to the Malling clonal rootstocks and their performance at Geneva, N.Y. Very briefly, results there indicate the usefulness of M. IX as a small garden tree bearing in the first or second year from planting. They show that M. I is well adapted to McIntosh, producing well-anchored, thrifty trees fruiting at 3 years old. M. I also suits Northern Spy and R. I. Greening. M. XIII worked with Cortland provides a semi-dwarf, apparently well adapted for heavy soils. M. XVI is promising for the production of trees only slightly smaller than the standard. In addition to these, other promising rootstock material has been produced by the U.S. Department of Agriculture and certain hardy rootstock forms from Canada, including forms of *Malus robusta* and *M. baccata*, are worth watching and trying.

1055. KEMMER, E., AND SCHULZ, F. 631.541.11: 634.11 +634.13 +634.22
Die Bedeutung des Sämlings als Unterlage. (Baumschulstadium.) **(The significance of seedlings as rootstocks. [The nursery stage.])**
Gartenbauwiss., 1943, **18**: 59-97.

Extensive tests of seedlings as rootstocks for apple, pear and plum varieties have been carried out at Berlin University since 1930. The present paper gives a very detailed report on observations made on their behaviour during the nursery stage and comes to the following conclusions: (1) The use of triploid seedling rootstocks is to be discouraged. (2) On the whole, seedlings from the majority of diploid varieties were found suitable as rootstocks during the nursery stage. (3) Seedlings from *Pyrus sinensis* are remarkable in respect of the vigour shown by the scion variety. The performance of seedlings from a number of varieties both in the seedbed and in the nursery is described. (4) The origin of seedling rootstocks was of no apparent importance, either in the seedbed or in the nursery, nor could any influence of the scion variety upon the root system of the stock be discovered. (5) The number of trees in the nursery, which were ready for sale, varied largely in different years. It is suggested that annual differences up to at least 20% should be attributed to varying climatic conditions and not to differences in genetic constitution. (6) On the average 66% of the trees raised in the nursery were ready for sale at the normal time. (7) A new term "Remanenz" (developmental check) is introduced to describe a state in between compatibility and incompatibility. It may be of interest to elaborate this point more fully. Rootstocks, which would normally be discarded because of the thinness of their stems, were budded at the same time as the stronger material and were generally found to catch up completely. This capability for catching up has been used as a test method in a study of certain expressions of imperfect compatibility. It occurs frequently that young fruit trees on seedling rootstocks show this developmental check. If such trees catch up later on, the temporary check is called "ecological remanence" as against "genetical remanence", which approaches true incompatibility. The authors' theory of incompatibility is illustrated in a diagram, which includes such terms as mechanical, physiological, "remanent" and pathological incompatibility. In a final chapter, the relative merits of seedling and clonal rootstocks are discussed. An appendix of 11 pages gives tabulated data of the results.

1056. KEMMER, E. 631.541.11: 634.1/7
Über die Standortzusammenhänge im Obstbau. **(The influence of locality in fruit growing.)**
Dtsch. Obstbau, 1943, **58**: 97-8, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 9.

According to the author, the rootstock of a fruit tree should be regarded as a locality factor, the scion variety being affected by many factors through the medium of rootstock only.

1057. SELBY, H. C. 634.11-1.521
Dessert apple growing. Some stray thoughts.
Fruitgrower, 1944, **97**: 457-8, 462.

The author gives an account of his own experience in growing a number of dessert apple varieties on No. II rootstock in the Wisbech district. He comes to the conclusion that dessert apples, by and large, are a commercial proposition on good land with the probable necessity of grass turned in every two or three years where required. Among other things he recommends that No. II should be worked at 12-15 in. so as to allow of deep planting to counteract the tendency to fall due to the prevailing wind.

1058. HÜLSMANN, B. 634.13-1.541.11: 634.14
Morphologische Beobachtungen an Unterlagenquitten aus Wageningen. **(Morphological observations on rootstock quinces from Wageningen.)**
Gartenbauwiss., 1942, **17**: 201-10.

Of 23 quince rootstocks sent to Berlin University from Wageningen, 8 were found to be morphologically identical with the Malling varieties. Although several of the rootstocks differ from those used in Germany they showed no greater hardiness than the Malling varieties and not one of the collection survived the winter of 1941 in the stool bed. It is emphasized that morphological identity need not imply genetical identity. The type descriptions are supported by photos of both roots and tops.

1059. BREVIGLIERI, N. 631.541.11: 634.3 +634.25
Ricerche sul comportamento dei portainnesti del pero e del pesco in rapporto ad alcune caratteristiche pedologiche. **(The behaviour of pear and peach rootstocks in response to certain soil properties.)**
Pubbl. Univ. Studi Firenze, Fac. agrar. for., 1941, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 48.

The effect of certain soil properties, particularly pH and lime content, upon a number of pear and peach rootstocks is discussed. The fact that many tree fruits are lime-shy does not mean that they require an acid soil. Chlorotic symptoms in fruit trees need not necessarily be caused by a too high lime content in the soil, but the latter will increase the disposition to chlorosis. The degree to which pears and peaches are disposed to develop chlorosis seems to be a varietal characteristic.

1060. DE WET, A. F. 634.25-1.541.11
A preliminary study of peach varieties on peach and plum roots.*
Sci. Bull. S. Afr. Dep. Agric. **226** (*Stellenbosch Ser.* **46**), 1941, pp. 19, bibl. 9, 3d.

Export, canning, and drying varieties of peach were budded in 1936 on mariana, methley, myrobalan A, myrobalan B plum stocks and on Transvaal yellow peach stock, using the shield budding method and tying with raffia. Observations were made of growth and incompatibility. The peach roots proved to be better suited to the varieties tested than any of the plum rootstocks tried. The percentage bud take was low on all stocks, especially on the myrobalans, and it was impossible to prove any direct case of lack of affinity, all symptoms of incompatibility being of a delayed nature. These were especially noticeable in the premature dying off of trees on certain stocks in the nursery and in the first few years in the orchard. Trees on unsuitable stocks were dwarfed, showed excessive swelling at the union and produced smaller and fewer fruits, while their leaves grew abnormally and were prematurely shed. Previous indications that percentage bud take cannot be regarded as a reliable indication of degree of affinity were confirmed.

* See also *H.A.*, 11: 44.

Rootgrowth.

1061. DE ALMEIDA, F. J. 634.63: 581.144.2
Organogenia das formações radicíferas da oliveira, *Olea europaea* L. **(Characteristics and evolution of the root-bearing swellings of the olive.)** [English summary 2 pp.]
Agron. lusit., 1942, **4**: 31-59, bibl. 43.

The swellings on the stems of young olives 1 to 2 years old are of the same nature as the root-bearing swellings found in the trunks of old trees. They usually appear as two opposite overgrowths not necessarily of equal size, placed on the first node of the stem in the place of fallen leaves. Similar overgrowths may appear on the second and third nodes, but their development is less marked. A differentiation of superficial adventitious buds arises round the typical axillary bud after leaf fall, the bundles of these buds being derived as branches from the bundle of the original bud; cambial activity produces very thick wood layers in the overgrowth but the cork layers become thinner owing to lateral pressure caused by the centrifugal progress of the cambium. Root primordia are originated in the immediate neighbourhood of the cambium. Usually these roots perish from the heat of sun owing to insufficient protection from the cork, but cuttings containing the swellings root at these nodes under greenhouse treatment, especially those from the lower portion of the stems. A possible explanation of roots forming in these swellings lies in the fact that the abnormal thinness of the tissues favours easy penetration of oxygen to the cambium. Stem swellings in species other than olive seem to indicate tolerance of drought and of low soil fertility. The paper is well illustrated.

1062. NATIVIDADE, J. V. 634.63: 581.144.2
Os mamilos radicíferos da oliveira (*Olea europaea* L.). **(Root-bearing mammillae of the olive tree.)** [English summary ½ p.]
Agron. lusit., 1940, **2**: 169-79, bibl. 7.

Rooting habits and root characters of olive plants propagated by vegetative methods are described with the help of illustrations.

1063. NATIDIVADE, J. V. 634.63: 581.144.2
Nota sôbre o sistema radicular da oliveira. **(The root system of the olive.)** [English summary 10 l.]
Agron. lusit., 1941, **3**: 15-24, bibl. 3.
A study of some uprooted trees.

RODRIGUES, A., AND DE ALMEIDA, F. J. 634.63: 581.144.2
Sôbre o desenvolvimento de exostoses e a emissão de raízes nos caules das plantas novas de *Olea europaea* L. **(A study of the development of swellings and adventitious roots on the stems of young olive plants.)** [English summary 1 p.]
Agron. lusit., 1942, **4**: 237-64, bibl. 12.

NATIVIDADE, J. V. 581.144.2: 634.63 + 634.462
O significado ecológico e fisiológico do sistema radicular aéreo da oliveira (*Olea europaea* L.) e da alfarrobeira (*Ceratonia siliqua* L.). **(Ecological and physiological significance of the aerial roots of the olive and carob.)** [English summary 1 p.]
Agron. lusit., 1941, **3**: 85-91, bibl. 11.

Pollination.

1064. EWERT. 634.11: 581.162.3
Eigene Erfahrungen über die Fruchtbarkeit triploider Apfelsorten. **(Observations on the fertility of triploid apple varieties.)**
Dtsch. Obstbau, 1942, **A57**: 81-3, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 46.

The author's observations over a period of years showed that triploid apple varieties are not less fertile than diploid varieties, provided pollinators are available. Gravenstein, for instance, planted in a 2 km. long plot, was found to decrease in yield and in number of seeds per fruit as the distance from the next diploid apple increased.

1065. KOHANOVSKAJA, L. N. 634.2-1.523
Facilitating hybridisation among *Prunus* spp. by means of temperature variation. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 154-8.

Flowers of *Prunus spinosa* were pollinated from myrobalan, greengage, peach, apricot and cherry. When the temperature was raised to 35-40° C. for several hours during two or three successive days while the pollen was on the stigma, the proportion of successful pollinations was increased. It is not suggested that the increased rate of penetration by the pollen tube, observed microscopically, was entirely responsible for the successful setting of blossom.

1066. RUDLOFF, C. F., AND SCHANDERL, H. 634.1/8: 581.162.3
Die Befruchtungsbiologie der Obstgewächse und ihre Anwendung in der Praxis. **(The biology of pollination in tree fruits and its practical application.)**
Grundl. u. Fortschr. i. Garten-u. Weinb., H. 64, E. Ulmer, Stuttg., 1942, pp. 136, RM. 3.40, from review *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 42-3.

The usefulness to scientists of this book, which is said to consider the entire German literature on the subject, is emphasized by the reviewer.

1067. GRAINGER, J. 581.145.1
The causes and control of flowering.
Chron. bot., 1943, **7**: 400-2.

An adequate supply of carbohydrate to the growing point is described as the major need for a transition from vegetative to floral activity in the plant. By removing three-quarters of the total flowers from a profusely blooming apple tree, which was liable to drop its flowers and to fruit poorly, the author was able to induce very satisfactory bearing.

Manuring and cultural operations.

1068. LOTT, R. V. 634.25-1.842.3
Effect of nitrate of soda on development of the Halehaven peach.
Bull. Ill. agric. Exp. Stat. **493**, 1942, pp. 323-84, bibl. 73.

The development of the fruit on 2 six-year-old Halehaven peach trees was studied at Urbana, Illinois, by determining at weekly intervals the diameter, volume, fresh weight and dry weight of the entire fruit, the flesh, the stone and the kernel, and by analysing the flesh, the stone and the kernel for reducing sugars, sucrose, starch and dextrin, hemicellulose, total nitrogen, ash and ether extract. One of the trees received 2 5-lb. applications of nitrate of soda, the first 17 days before full bloom, the second 51 days after bloom. When the data obtained for increase in diameter, volume or fresh weight were taken into account 3 growth periods could be distinguished, extending to approximately 57, 76 and 117—in the case of the nitrated fruits 123—days respectively after bloom. The development during the 3 phases is described. The chief effects of the nitrogen fertilization, which did not become evident until about 3 weeks before harvest, are summarized by the author as follows: "*In the tree:* greater yield, more and longer shoots; larger, heavier and greener leaves; and more fruit buds for the succeeding year. *In the fruit:* greater size, six days later ripening, slightly less intense color, no detectable difference in quality, and a greater ratio of flesh to stone on both the fresh-weight and the dry-weight basis. *In the flesh:* higher percentages of starch and dextrin, ash, and nitrogen; but lower percentages of reducing sugars and hemicellulose. *In the stone:* greater size and weight, higher percentage of nitrogen, hemicellulose, starch and

dextrin; but lower percentages of sugars and ash. *In the kernel:* greater dry weight, and greater percentages of all constituents except reducing sugars." It is concluded that a liberal application of available nitrogen to peach trees is desirable.

1069. Murneek, A. E., and Hibbard, A. D. 631.874: 634.1/7
Substitutes for nitrogen fertilizers in orcharding.
Circ. Mo. agric. Exp. Stat. **236**, 1942, pp. 7.
Consideration is given to sources of nitrogen, including sod cover broken up, leguminous green manure crops, farmyard manure, packing house refuse, poultry farm waste. The legumes most often used in Missouri orchards for green manuring are hairy vetch, crimson clover, bur clover, sweet clover, red clover, cow peas, soybeans, Korean lespedeza, crotalaria.

1070. Ruth, W. A. 634.25-1.83
Potash in peach orchards.
News Lett. Ill. St. hort. Soc. **2**, 1944, pp. 3-4.
It is suggested that the practice of using only nitrogen as a fruit tree fertilizer is a mistake, at any rate in south-central Illinois. In support an article is reproduced from the November number of *Illinois Horticulture* 1923 in which work on the Olney (Ill.) experiment farm indicated that the growth of the peach was decidedly influenced by potash and that the crop could not be gauged by length or amount of growth alone. It is recommended that potassium sulphate should be used but that on poor soils nitrogen should be added, for where on such soils this was not done lesions resembling shot-hole were formed in the foliage.

1071. Boynton, D., and Compton, O. C. 631.433
Normal seasonal changes of oxygen and carbon dioxide percentages in gas from the larger pores of three orchard subsoils.
Soil Sci., 1944, **57**: 107-17, bibl. 11.
The amount of oxygen in gas from heavy subsoils in north-eastern U.S.A. is normally low in spring and increases with the advance of the season. Carbon dioxide fluctuates within a narrow range, reaching maximum levels during summer when oxygen is also at a high level.

1072. Truninger, E. 546.27: 631.811.9
Versuche und Untersuchungen über die Wirkungen des Bors als Spurenelement. **(Investigations on the effect of boron as a trace element.)** [French summary 2 pp.]
Landw. Jb. Schweiz, 1944, **58**: 1-36, bibl. 18.
A summary of the available practical knowledge on boron and its effects on plant life. Boron is actually present in tourmaline, a silicate of aluminium and boron, in most cultivated soils, but it remains extremely unavailable in this form. The application of boron alone or in conjunction with complete neutral manuring to a slightly acid soil has no effect at all except on such boron-loving plants as beetroot. Only after the soil reaction has been made alkaline by the addition of large quantities of lime, and when boron deficiency symptoms have become evident, will the application of boron tend to diminish these symptoms and even increase the crop. The addition of boron to alkaline manures applied to vegetable crops which have already received a basic manuring has increased the crop. Boron content in the plant, especially in stalk and leaf, is greatly increased by the application of even the smallest amounts of boron, e.g. 4½ lb. an acre. The development of the generative organs is most favourably affected by boron. Liming nearly always results in decreased boron content in the plant. Decrease in boron content can generally be correlated with increased nitrogen content in the parts of the plant concerned. Generally speaking the rate at which different plants remove boron from the soil varies from 4·9% to 20%. There are indications that the effect of boron in the soil will not last more than 2-3 years. In trials with mustard, in which the effect was measured of increasing boron at the same time as increasing the supply of lime, 5 kg. of boron per ha. in conjunction with heavy liming was beneficial. Cropping decreased when the amount of boron was increased to 50 lb. and even more so when it was raised to 100 lb. The presence of lime resulted in diminished toxicity of excess boron. It is surmised from this that to obtain good effects from boron it is necessary, apart from the application of large amounts of lime or the alkaline reaction of the soil, to assure to the plants an adequate amount of other fertilizing elements. Boron can in no case take the place of other fertilizers. The lack of boron noticeable after heavy liming might be attributed to the absorption of boron by the sesquioxides brought into solution by the alkalinity of the soil solution. There is no question of the formation of a somewhat insoluble calcium borate. It follows that boron deficiency in soil is related not to the Ca ions but to the OH ions present. Thus the presence of gypsum, even in large quantities, unlike carbonate of lime, does not create any boron deficiency. The greater effect of Chile nitrate as compared with that of artificial nitrate of soda is due to the boron in the natural product. The difference in effect of these two substances is particularly marked in recently limed soils. It can be nullified by adding boron to the nitrate of soda. Good results can be obtained by the use of marl which contains boron, but only when it is used in large amounts. The boron present in marl appears, owing to its exceptional fineness, to have greater effect than a corresponding amount given as boric acid or borax. The fact that many Swiss soils suffer from lime deficiency and need liming and that boron deficiency is easily induced by heavy liming shows that the use of boron is closely related to that of lime and suggests that more may be heard of the problem in the future than hitherto. It is not, however, suggested that boron should, without more ado, be applied in the cultivation of such plants as sugar beet which have a great need for it, but it is urged that a study of soil reaction should previously be made to discover whether boron deficiency symptoms are likely to appear. Nowadays, in times of increasingly intensive methods of cultivation, involving the greater use of highly concentrated fertilizers, in which trace elements are only present, if at all, in negligible amounts, trace elements and among them boron demand greater attention. However great the application of the chief fertilizing elements their effect will be nil in the absence of adequate boron. Conversely boron will have its best effect only when other nutrients and growth factors are present in optimum relations and amount, when the resulting increase in growth will demand maximum amounts of boron. [From author's summary.]

1073. Dennis, A. C., and Dennis, R. W. G. 546.27: 631.811.9
Boron and plant life. Part V. Developments in agriculture and horticulture, 1940-42.
Reprinted from the *Fertiliser, Feeding Stuffs and Farm Supplies J.*, 1943, March 17 and 31, April 14 and 28, May 12 and 26, pp. 38, bibl. 186.
A comprehensive review of advance in knowledge of the effect of boron on plant growth. The authors indicate that there may be a fair amount of foreign literature which under present circumstances they have been unable to consult. Considerable space is given to work on the effect of liming on boron availability and of the pH factor in soils. As touching weather effects boron is noticeably liable to leaching by heavy rain and it may be noted that trials in New Hampshire have shown that the most important predisposing factor to internal cork in apples—a boron deficiency disease—in that State is drought in June and July. Work on boron deficiency in apples, pears and a large number of vegetables, e.g. celery, carrot, tomato, beet, spinach, etc., is discussed. Its interrelations with other nutrients are considered. The names of 45 additional plants are given, for which boron has been proved essential.

1074. HASLER, A. 546.27: 631.811.9
Ueber den Borgehalt von Böden und Gesteinen. **(The boron content of Swiss soils and rocks.)** [French summary 1 p.]
Landw. Jb. Schweiz, 1942, **56**: 486-98.
Notes on similar determinations of boron in the soils and rocks of other countries are followed by a brief description of methods used by the author. The amount and availability of the boron present in different formations in Switzerland are considered in detail and the possibility of using them is discussed. The conclusion is reached that the marls and argillaceous marls, especially those of the Jurassic system, may be of some importance as sources of lime and boron for manurial purposes.

1075. SCHROPP, W. 632.51: 632.19: 546.27
Über die Wirkung des Bors auf einige Unkräuter. **(The effect of boron on some weeds.)**
Bodenk. PflErnähr., 1943, **30**: 381-92, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 3.
All the 13 weeds tested needed boron and showed the common deficiency symptoms seen in cultivated plants in its absence.

1076. PALMER, E. F., AND VAN HAARLEM, J. R. 634.1/2-1.87
Orchard soil management.
Bull. Ontario Dep. Agric. **437**, 1944, pp. 45.
This is a growers' bulletin, rather than a research review. While touching on nearly all aspects of soil management, its main theme is "cultivate less and maintain soil organic matter by all possible means". This is backed by copious quotations from work published in various parts of the U.S.A. and by observations and some experimental results at Vineland. The effects of various soil management practices are contrasted. Clean cultivation is soil-depleting and leads to erosion. The culture of the following cover crops, alfalfa (lucerne), soybeans, sweet clover, buckwheat, millets, mixed grains, rape, Sudan grass and weeds and the use of organic residues such as farmyard manure, sawdust, hay and straw, is described. Soybeans are especially recommended, and sweet clover with buckwheat as a nurse crop. A table summarizes the nutrient value per ton of various farm residues. Clean cultivation with cover crops is contrasted with sod culture and sod mulches. "Minimum cultivation" (i.e. spring ploughing and preparation of a seedbed for cover crops sown by 15 May) was compared with "normal cultivation" (i.e. clean cultivation till 15 July followed by cover cropping), for 15 years at Vineland, and with 3 varieties gave almost equal total yields, suggesting that "normal" cultivation was wasteful and not advantageous. In another trial comparing McIntosh yields for 15 years under (1) cultivation and cover crops throughout, (2) grass sod mulch throughout with nitrogen as required, (3) alfalfa sod mulch throughout, (4) cultivation 6 years then grass sod mulch, and (5) cultivation 6 years then alfalfa sod mulch. (3), (4) and (5) gave about 10% higher yields than (1) or (2). Starting the orchard in sod checked the trees at first, but they caught up later. Starting in cultivation and seeding down later gave good results. Piling the cut material as a mulch round the tree, starting 1 ft. to 2 ft. from the trunk to avoid mouse damage, and extending just beyond the branches, is strongly advocated. Both alfalfa and grass mixtures are recommended. Extra materials such as straw can be added, but pea bines are not suitable. Sod mulch is recommended for apples, pears and sweet cherries wherever possible. For peaches, plums and sour cherries clean cultivation and cover cropping are considered more suitable. Less cultivation than that commonly given may be sufficient. Notes are given on manuring, including trace elements and deep placement of manures. This is an attractive, well-illustrated and valuable bulletin from the growers' point of view, but it is a little difficult to disentangle the scientifically proved facts from the provisional conclusions based on observation.

W.S.R.

1077. (SHAW, J. K.) 634.11-1.875
Hay mulches in Massachusetts apple orchards.
News Lett. Ill. St. hort. Soc. **7**, 1943, pp. 3-4.
A summary is given of the results of recent experiments with hay mulch for apple orchards carried out at Massachusetts Experiment Station. Numerous feeding roots are produced under the mulch, the soil temperature is less variable, the water content of the soil higher and the soil is kept well aerated. The most important influence, however, seems to be a more liberal supply of nutrients for the trees without the risk of deficiency symptoms appearing. On some Massachusetts soils a liberal fertilizing with nitrogen will eventually cause a potash deficiency, though it may be long in becoming apparent, and if this is remedied a magnesium deficiency occurs. Preharvest drop is heavier on mulched soils, but the crop picked is, in general, larger; colour is not very good. The amounts used are from 4 to 8 tons of air-dried hay per acre per annum. Possibly this is too high. The hay was grown outside the orchards.

1078. LE ROUX, J. C. 634.1/7-1.543
Contour systems for orchards.
Fmg S. Afr., 1943, **18**: 733-8, 746.
The lay-out of orchards and irrigation systems on irregular slopes according to the contour planting method is explained and illustrated by diagrams and photos.

1079. EVANS, H. H., AND HOY, B. 634.1/2-1.542
Pruning fruit trees.
Hort. Circ. B.C. Dep. Agric., **60**, 1942, pp. 29.
A well illustrated, concise description of pruning methods for fruit trees embodying the results of more recent work.

1080. HOFFMANN, M. B. 632.95: 634.11-1.55
Some possibilities of cutting the labor for fruit thinning with bloom sprays.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 50-8.
Tests with a number of different apple varieties indicate that spraying with Elgetol, a proprietary product containing the sodium salt of dinitro cresol, at a concentration of 1 pint per 100 gallons water may result in very satisfactory thinning of vigorous varieties. The spraying should take place on the first day of full bloom and should be thorough enough to cover every flower. It should not be applied to very weak trees or those which have not received fertilizers in previous years. The result should be an adequate crop of good size and quality.

1081. PIÉDALLU, A. 634.1/2: 581.148.5
Comment rajeunir les arbres fruitiers. **(Rejuvenating fruit trees [in North Africa].)**
Rev. Hort. Agric. Afr. N., 1941, **45**: 74-7.
Decrepitude of fruit trees in North Africa is often caused by the presence of a rocky subsoil lying within a foot of the surface. Trees under these conditions can often be rejuvenated by breaking the subsoil by means of explosives. With the aid of a crowbar three or four holes are made in the rock, distributed equidistantly, at the perimeter of the branches and to a depth of 70 cm. to 1 m. One to three cartridges of "agricultural explosive" are inserted in each hole and tamped with earth or sand. The firing of the charge produces a spheroidal hole from which multiple fissures radiate in all directions to a distance of 5 to 7 m. from the axis of the hole. Although not essential, it is of benefit to pour a can or two of liquid manure into the cavity before filling, or a mixture consisting of 1 kg. sulphate of ammonia, 1 kg. chloride of potash, 3 kg. superphosphate per tree may be tamped into the cartridge boring before firing. Just after harvest is a suitable time for blasting, the ground being dry or just slightly moist. Old trees should be trimmed up beforehand and if necessary the branches cut back. The trees take on a rejuvenated

appearance the first year and should crop well in the second. The yield of date palms has been trebled, that of olives doubled, and good results have been obtained with all the other commercially grown fruits in the French African possessions.

1082. CROCE, F. M. 634.22-1.56
Cosecha de ciruelas. **(Harvesting plums.)**
Alm. Minist. Agric. B. Aires 1944, **19**: 79-80.
Plums for preserving in syrup by the Appert method must be picked when full ripe, the pulp firm and the sugar content at its maximum. Fruit picked too early will be insipid and poor in colour and quality. If over-mature the juice will be cloudy and the fruit shapeless and unattractive in appearance. Instructions are given on picking the fruit, on the appliances required, and the best method of getting it undamaged to the factory. When picking, the stalk should not be pulled out of the fruit or the skin may be torn and the wound become infected. Every effort must be made to preserve the bloom. Owing to the fruits not ripening simultaneously a tree may have to be picked over from 2 to 5 times, the work to be done preferably in the morning after the dew has passed. Fruit picked in the afternoon should be left that night in the plantation, where it will be cool, so that ripening may be checked before it is sent to the factory.

1083. ANZORENA, P. 634.22(82)
El ciruelo. **(Plum growing in Argentina.)**
Bol. Frut. Hort. B. Aires 1937, No. **24**, pp. 55.

GARCIA, D. A., AND OTHERS. 634.25(82)
El duraznero. **(Peach growing in Argentina.)**
Bol. Frut. Hort. B. Aires 1936, No. **10**, pp. 56.

MALHERBE, I. DE V. 631.436: 634.1/7
Soil climate with special reference to temperature fluctuations in an orchard soil at Stellenbosch.
Sci. Bull. S. Afr. Dep. Agric. **174**, 1938, pp. 28, bibl. 24.

SCHMITZ-HÜBSCH, H., AND HEINRICHS, P. 634.1/2-1.546
Der Spindelbusch und seine Behandlung beim Pflanzen und Schneiden. **(The planting and pruning of cordon trees.)**
R. Bechtold & Co., Wiesbaden, 1943, 4th ed., pp. 48, RM. 1.50, from abstract *Forschungsdienst*, 1943, Vol. **16**, abstr. p. 18.

SMALL FRUITS, VINES AND NUTS.

1084. STRONG, W. J. 634.72
Currants and gooseberries.
Bull. Ontario Dep. Agric. **440**, 1944, pp. 23.
The interest in growing currants and gooseberries, particularly black currants because of their vitamin C content, having increased lately in Ontario, the available knowledge on these soft fruits has been compiled at the Vineland Horticultural Experiment Station in a bulletin, which covers all aspects of their cultivation including the description of recommended varieties. The following yield figures per acre were obtained for black currant varieties at the Central Experimental Farm, Ottawa, in 1941: Saunders and Kerry over 4 tons, Magnus 3¾ tons, Climax about 4½ tons and Boskoop Giant 2¾ tons.

1085. SWARTWOUT, H. G., AND MARTIN, W. R., Jr. 634.711 +634.715
Growing raspberries and blackberries.
Bull. Mo. agric. Exp. Stat. **450**, 1942, pp. 32.
A full account of the technique involved in propagating and cultivating black, purple and red raspberries and blackberries, including under blackberries, Brainerd, Boysenberry and Lucretia. Considerable attention is paid to pruning practice. Berries of all of these are best packed for market in pint or sometimes quart boxes. Estimated yields are put at black raspberries 1,200-1,800 quarts per acre, purple raspberries slightly more, red raspberries 1,000-2,000 quarts, blackberries—late maturing varieties—1,800-2,000 under favourable weather conditions. The control of the more common pests and diseases is also considered.

1086. KRASINSKIĬ, N. P. 634.741-1.56
Juniper berry as a new source of sugar. [Russian.]
J. Bot. U.R.S.S., 1943, **28**: 208-10.
The author elaborated, together with a team of workers, a simple and cheap process of obtaining a juniper berry extract containing 25-30% sugars free from bitter glucoside and essential oil. Each ton of berries will yield 300 kg. of syrup containing 60% of sugars. Degustation tests carried out at various industrial establishments showed that the extract can be used for the preparation of shortbread, cakes, mineral waters, wines and spirits. It is estimated that an annual yield of about 30,000 tons of juniper berries is available in 16 provinces, territories and republics of the Soviet Union.

1087. TALBERT, T. J., AND HIBBARD, A. D. 634.75
Commercial strawberry culture in Missouri.
Circ. Mo. agric. Exp. Stat. **216**, 1941, pp. 24.
A 5-year rotation is suggested for strawberries in Missouri consisting of:—1st year, either corn or tomatoes, sweet potatoes or late cabbage; 2nd year, oats and cowpeas or early potatoes, early cabbage or Bermuda onions instead of oats; 3rd, 4th and 5th years, strawberries. It is admitted that a 4-year system in which a strawberry field is planted each year might obviate losses from pests and disease. Varieties recommended for commercial production are Premier, Aroma, Blakemore and Dunlap. Normal planting distance adopted is 3 to 3½ feet in the rows and 4 feet between the rows. As regards nutrition it is suggested that supplies of organic matter should be built up in the soil by ploughing in organic manure or a green crop. When preparing the soil the top 3 or 4 inches should have a complete fertilizer 2-8-2 or 4-12-4 at the rate of 250 to 300 lb. per acre incorporated by cultivation. After planting, the application of a nitrogenous fertilizer such as sulphate of ammonia may show increased returns. When renewing fields 250 to 300 lb. of a 4-12-4 fertilizer should be applied on the poorer soils. After harvesting, the field should be mowed and raked rather than burned. Under Missouri conditions mulching should be carried out at the end of November or beginning of December, i.e. before the first hard frost. Wheat straw, marsh grass, coarse strawy manure, rye straw, pine needles, etc., will all do as mulching material. Two to four tons an acre should suffice and should cover the plants 2 to 3 inches deep. Notes are given on harvesting and shipping. The attacks of strawberry leaf spot and the strawberry leaf roller and crown-borer may necessitate the use of bordeaux and arsenate of lead.

1088. SWARUP, S. R. 634.75
The strawberry: its cultivation and economic possibilities in the United Provinces.
Bull. U.P. Dep. Agric. **5**, 1943, pp. 6, 1 anna.
The bulletin suggests that the cultivation of strawberries in the United Provinces, India, should be a profitable industry for small holders in the neighbourhood of large towns.

1089. MINGES, P., MANEY, T. J., AND PICKETT, B. S. 634.75
Strawberry production in south-eastern Iowa, as influenced by varieties, fertilizers and cultural practices.
Res. Bull. Ia agric. Exp. Stat. **295**, 1942, pp. 509-64, bibl. 46.
Variety, cultural and fertilizer tests with strawberries were conducted by the Iowa Station over a period of 5 years. Of the 45 standard and certain other seedling varieties tested

the most generally satisfactory commercial sorts appeared to be Blakemore and Premier. Results indicate that varieties are very sensitive to local conditions. Stable manure was the only fertilizer material which consistently increased yields. Commercial fertilizers were not beneficial, except after one season of abnormal climatic conditions in which severe drought had weakened the plants considerably. Applications of phosphorus—deficient in some Iowa soils—in one season somewhat increased size and yield. Excessive weed growth due to the use of fresh wheat straw containing numerous weed seeds made some plantations unproductive and reduced their lives.

1090. KELLY, C. B. 634.8
The grape in Ontario.
Bull. Ontario Dep. Agric. **438**, 1944, pp. 38.
This well illustrated monograph presents the most recent information on grape culture as adapted to Ontario conditions and embodies the latest experience on old and new varieties for wine-making purposes.

1091. RODRIGUES, A. 634.8: 581.45
Variações do recorte da fôlha da videira. (**Variations in vine leaf margins.**) [English summary 24 ll.]
Agron. lusit., 1941, **3**: 189-93.
An account is given of the variations in venation, particularly counts of teeth in leaves of Riparia grande glabra and Rupestris du Lot and of the hybrid vine Rip.×Rup. 101-14.

1092. RODRIGUES, A. 634.8: 581.45
Acêrca do valor taxonómico do número de dentes da fôlha na separação de dois híbridos do género *Vitis* L. (**The value of the number of teeth on the leaf for distinguishing two vine hybrids.**) [English summary 1 p.]
Agron. lusit., 1941, **3**: 325-40, bibl. 16.
There are indications that very careful measurements show significant differences in dentation of three distinct regions of the leaves of the hybrids Rip.×Rup. 101-14 and Rip.×Rup. 3306.

1093. RODRIGUES, A. 634.8: 581.45
Sobre o recorte e assimetria da fôlha da videira. (**Foliar asymmetry in vines.**) [English summary 1 p.]
Agric. lusit., 1942, **4**: 137-53, bibl. 12.
Again the hybrids Rip.×Rup. 3309, Rip.×Rup. 3306 and Rip.×Rup. 101-14 provided the material for investigation. An attempt was made to determine the relations between foliar asymmetry and contour and the taxonomic value of this character in differentiating between hybrids.

1094. RODRIGUES, A. 634.8: 588.144.2
Raízes aéreas na *Vitis vinifera* L. (**Aerial roots in some varieties of *Vitis vinifera* L.**) [English summary 2 pp.]
Agron. lusit., 1942, **4**: 5-27, bibl. 32.
The sudden development of aerial roots on some varieties of *Vitis vinifera* was studied. Root development, which took place on branches of 1 to 3 years and on the trunk, is thought to be due to abnormal conditions of temperature and humidity bringing about a period of great metabolic activity. The roots ceased to grow and those which had emerged from the cortex died when environmental conditions became unfavourable. Differentiation took place on the cambium of the medullary rays and the roots were able to get at least a partial hold of the vascular system of the leaf bundles. Features of anatomic structure and physiological activity of the leaf bundles, apparently related to root differentiation, are described. The leaf bundles were evidently used for the transport of substances involved in root differentiation.

1095. SCHELLENBERG, H. 634.8-1.523
Der Riesling×Sylvaner. (**The hybrid vine Riesling×Sylvaner.**)
Schweiz. Z. Obst-u. Weinb., 1943, Vol. **53**, Sondernummer, pp. 24-32.
At the 23rd meeting of the Swiss Vine Growers' Association at Zürich in February 1944, a session was devoted to the hybrid Riesling×Sylvaner, which had its origin in a cross made at Geisenheim in 1882. Cuttings of the seedlings were taken to Wädenswil in 1891, where eventually in 1906 seedling Nr. 58 (later Nr. 1) was selected and propagated. The characters of the hybrid, which has proved its worth and yielded 10,000 hectolitres in the German cantons of Switzerland in 1943, are described in detail and the wine is discussed.

1096. TSCHUMI, L., AND STALÉ, J.
634.8-1.541.11: 634.836.72
Contribution à l'étude de la reconstitution du vignoble valaisan. (**The reconstruction of vine growing in Valais.**) [German summary 1 p.]
Landw. Jb. Schweiz, 1943, **57**: 290-311, bibl. 11.
Following a decree of the Great Council of the Swiss canton of Valais the reconstruction of regional viticulture was begun in 1923 as a control measure against *Phylloxera* infestation. By the end of 1942 about half the area was replanted, but in many instances the development of the new plantations on the American rootstock *Riparia×Rupestris* 3309 proved disappointing. The present paper reports an investigation into the causes of this failure conducted at the Institute of Agricultural Chemistry, Lausanne, and suggests remedies. The scion being more exacting on the new rootstock, lack of nutrients is considered to be mainly responsible for the poor success. Annual requirements were found to average 90 kg. nitrogen, 100 kg. potash and 35 kg. phosphoric acid per hectare. The trouble which arose from an insufficient supply of fertilizers was aggravated by too shallow application. Especially on new plots, insufficient preparation of the soil before planting and lack of a suitable basic application will produce disastrous results. Other recommendations refer to the application of stable manure and of alkaline fertilizers on soils rich in lime. It is further suggested that it was a mistake to use the rootstock *Riparia×Rupestris* 3309 exclusively on all soils. The following soils proved to be unsuitable for the rootstock: (1) Soils in the plains with little aeration and a low content of gravel and lime; (2) soils, which contain more than 50% lime and little magnesia, particularly in the absence of balanced fertilizer applications; (3) soils overlying humid subsoils—owing to the rootstock's susceptibility to *Rosellinia necatrix*. However, good cultivation and consideration of nutrient requirements should increase resistance to unfavourable environmental conditions.

1097. SCHENK, A., WALDSBURGER, J., AND SCHWARZ, E. 634.872
Bericht betreffend die Durchführung der Aktion 1942 zur Förderung der Verwertung von einheimischen Tafeltrauben. (**Report on the utilization of home-grown table grapes in 1942.**)
Landw. Jb. Schweiz, 1943, **57**: 73-89.
In Switzerland, following a Government order, 244 wagon loads of home-grown grapes, 10 tons each, were put on the market for table consumption in 1942. The report gives a detailed account of the utilization of those grapes, dealing with such items as distribution and control of quality and price.

1098. LINDEMAN, B. W. 634.8
Grape vines for home gardens.
N.Z. J. Agric., 1944, **68**: 203-7.
It is shown how grape production in New Zealand could be increased by the planting of grape-vines in home gardens. Hints on cultivation are given and notes of suitable European and American varieties.

1099. PEYER, E. 634.8-1.546
Binden und Heften der Reben mit Papiergarn an Stelle von Schaub. **(The tying and fastening of vines with paper thread in place of raffia.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 92-4.
Repeated tests at Wädenswil showed that paper thread as a material for tying vines is not inferior to raffia. The slightly higher price of the former is set off by the economy in labour effected.

1100. GOLLMICK, F. 634.8: 581.162.3
Über die Lebensdauer des Rebenpollens. **(The longevity of vine pollen.)**
Angew. Bot., 1942, **24**: 221-32, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 41-2.
Experiments carried out at the Naumburg branch of the Biologische Reichsanstalt showed that vine pollen could be used for pollination work in the following year if stored at a relative atmospheric humidity of 40-50% and at a temperature of +1° C. After a short pre-drying treatment over calcium chloride the relative humidity was maintained by storing the pollen over a paste of calcium carbonate.

1101. DECKER, K. 634.8
Vor neuer Wirtschaftsform im Weinbau? (Betriebswirtschaftliche und bodenkundliche Betrachtung.) **(New viticultural methods? Remarks on economy and soil treatment.)**
Wein u. Rebe, 1942, **24**: 185-224, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 26-7.
The decrease in yield in German viticulture is thought to be due to a gradual deterioration of the soil owing to its exposure to all climatic influences with hardly any protection from the widely spaced vines. The growing of cover crops for green manuring on a big scale is the chief remedy suggested. In order to facilitate cultivation the author recommends that the distance between the rows should be increased, and this should be made good in part by a narrower planting within the rows.

1102. HUSFELD, B. 634.8-1.523
Die züchterischen Möglichkeiten in Menge und Güte des Ertrages bei interspezifischen *Vitis*-Kreuzungen. **(Increasing the yield and quality of vines by means of inter-specific *Vitis* hybridization.)**
Wein u. Rebe, 1943, **25**: 4-28, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 20.
ANON. 634.8-1.542
Zum Schnitt der Spalierreben. **(The pruning of espalier vines.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 88-91.
Illustrated instructions.

1103. TALBERT, T. J. 634.5
Nut tree culture in Missouri.
Bull. Mo. agric. Exp. Stat. **454**, 1942, pp. 32.
The cultivation of the following nuts is considered: Black walnut, butternut, Persian or English walnut, pecan, the hickories, American chestnut and chinquapins, and finally hazels. An account of stratifying seed and planting is followed by considerable detail of whip grafting and cleft grafting methods, waxing and subsequent treatment. Other grafts described are the inlay bark graft, notch method, slot bark graft method and side cleft graft method. In addition the technique of patch, ring, spur and plate budding is described. The illustrations, diagrammatic and otherwise, are helpful.

1104. SCHUSTER, C. E., STEPHENSON, R. E., AND EVENDEN, W. 581.144.2: 634.54+634.51
Mycorhizas of filbert and walnut trees in Oregon orchards.
Bot. Gaz., 1944, **105**: 388-92, bibl. 10.
Several hundred root samples were taken from nine filbert (*Corylus avellana*) and 12 walnut (*Juglans regia*) orchards representative of most of the soil types on which these trees are grown in the Willamette Valley and were examined histologically. It may be noted that ectotrophic mycorrhizas have not been found on the roots of walnuts nor endotrophic mycorrhizas on the roots of filbert. A study was made of differences in structure between mycorrhizal and non-infected roots. It was found that, regardless of soil type, degree of fertility or physical or chemical condition of the soil, mycorrhizas were equally abundant in all soils. Under field conditions there is no evidence that in the deep fertile soils mycorrhizas are either necessary or detrimental to the growth of large productive trees, or that mycorrhizal development on weak devitalized trees growing on shallow, infertile soil has promoted the decline of the trees.

1105. LEBEDEVA, T. A. 581.14.035: 634.58
The length of the daylight period and its influence on the growth of *Arachis*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 262-4.
The length of the period between germination and the beginning of flowering was not notably affected when eleven varieties of *Arachis* were exposed daily during this period to daylight lasting only 10 hours. The plants thus treated were neither hastened nor delayed in passing through the light phase. The subsequent yields of nuts showed that though the production of some of the varieties was increased under the influence of the shortened period of daylight, that of the others was unaffected by such treatment. The yields of foliage from all the varieties did not indicate any response to a shortened daytime. In a second experiment with two additional varieties—one of the Spanish, the others of the Valencia type—it was shown that when the period of daylight was reduced to 10 hours at, but not before, the onset of the flowering stage, the yield of nuts was increased in the Spanish variety but not in the Valencia. The relative and absolute yields of foliage, however, from both varieties were reduced.

PLANT PROTECTION OF DECIDUOUS FRUITS.

1106. MOORE, W. C. 632.3/4+632.8+632.19
Diseases of crop plants [in England and Wales]. **A ten years' review (1933-1942).**
Bull. Minist. Agric. Lond. **126**, 1943, pp. 101, 2s.
A map of advisory centres and provinces is followed by a list of 76 collaborators who have contributed information. A discussion of weather conditions during the ten years is followed by notes on diseases, grouped according to particular crops with main headings for cereals, potatoes, roots and fodder crops, pulse, pasture and forage crops, vegetables, fruit, hops and mushrooms and flax, ornamentals. References are given in the text to relevant and important articles on the different diseases. The bulletin ends with a satisfactory index which includes parasites, hosts and the common names of non-parasitic and virus diseases, but not the common names of parasitic diseases. Eighteen photographic illustrations break the necessary monotony of the text.

1107. FAES, H., STAEHELIN, M., AND BOVEY, P. 632.1/9
La défense des plantes cultivées. **(Plant protection.)**
Librairie Payot, Lausanne, 1943, pp. 500, 5th edition, from review *Schweiz. Z. Obst-u. Weinb.*, 1943, 53: 63-4.
The book is mainly concerned with conditions in French speaking Switzerland. Names of pests and plant parasites are given in French, German, Italian and Latin. Of 384 illustrations 314 are printed on art paper.

1108. NEERGAARD, P. 632.3/8(6)
7. Aarsberetning fra J. E. Ohlsens Enkes Plantepatologiske Laboratorium. **(7th annual report of J. E. Ohlsens Enkes Plant Pathology Laboratory.)**
Copenhagen, 1942, pp. 15, from review *Zbl. Bakt.*, 1943, Abt. II, **106**: 203-4.
During the period 1 April 1941 to 31 March 1942, covered by the report, 5,165 samples of different horticultural seeds were examined. The seed-borne fungus diseases, for the first time recorded in Denmark, are enumerated. *Phialophora mustea* was found to occur on apple juice.

1109. WHITE, W. H., AND DOOLITTLE, S. P. 635.1/7: 632.3/8
A victory gardener's handbook on insects and diseases.
Misc. Publ. U.S. Dep. Agric. **525**, 1944, pp. 30.
Practical illustrated directions on how to make use of available chemicals for combating common garden pests and diseases in the U.S.A.

1110. FERRES, H. M., AND TRUMBLE, H. C. 631.454
Exploratory investigations of soil deficiencies by means of small pot cultures.
J. Aust. Inst. agric. Sci., 1943, **9**: 179-82, bibl. 5.
It was decided in 1942 to test at the Waite Institute the method of pot cultures as a preliminary means of investigating a large number of soils simultaneously under comparable conditions of technical control. The pots used in the trials here noted were of approximately 0·7 kg. capacity (3½ in.× 5½ in.). Soil was taken to a depth of 4 inches from several portions of areas representative of particular soil types. This was mixed in a ¼ in. sieve painted over with clear Dulux and was turned, before filling, with a non-metal spade. The pots were watered with distilled water. Pots were maintained at 70% moisture capacity. Subterranean clover and Palestine strawberry clover were used as test plants. Responses are tabulated. The chief value of the method is that it provides a rapid lead to subsequent field trial, which must, of course, provide the final answer to deficiency problems.

1111. DE ALMEIDA, F. J. 634.63-2.19
A diagnose de deficiências nutritivas na oliveira pela injecção de soluções salinas. **(Diagnosis of mineral deficiency in olive by injection.)** [English summary 1 p.]
Agron. lusit., 1941, **3**: 59-70, bibl. 2.
Diagnosis of mineral deficiency in the olive by injection is not easy because of its low negative sap pressure, but since the olive suffers from unbalanced nutrition and tends to irregular bearing it is of interest that an injection technique suited to the olive should be devised. Attempts to do this are described. It was noted in the course of experiments that branches supplied with nitrogen as NH_3 yielded more normal fruits with a larger amount of pulp by weight and volume, and that aborted fruits on the same branches became round in form and remained on the tree for a long time.

1112. DECKER, K. 634.8-2.191
Über die Chlorose im Zusammenhang mit dem Boden. **(The chlorosis of vines in relation to the soil.)**
Wein u. Rebe, 1943, **25**: 89-96, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 4.
It is suggested that the lack of bacteriological soil fermentation following heavier rainfall in recent years, in connexion with a high lime content, is responsible for the spread of chlorosis in German vineyards.

1113. THORNE, D. W., AND WALLACE, A. 632.191
Some factors affecting chlorosis on high-lime soils: 1. Ferrous and ferric iron.
Soil Sci., 1944, **57**: 299-312, bibl. 34.
This report, which also gives a survey of the literature, covers preliminary experiments in the course of a research programme conducted at Utah Agricultural Experiment Station. The authors summarize their results as follows: "In a study of soil samples from areas producing chlorotic plants in comparison with samples from nearby areas producing green plants it was found that the latter soils contained significantly more readily reducible iron and manganese (by 0·2% hydroquinone solution) than did soils producing chlorotic plants. Ferrous and ferric iron salts added to either class of soil were quickly immobilized, only small quantities remaining reducible by 0·2% hydroquinone. Chlorotic leaves from peach, pear, grape, prune, and apple contained more potassium and nitrogen and less iron and calcium than did green leaves. The iron content of green leaves was significantly higher than that of chlorotic leaves when results were expressed on the basis of leaf area, but when expressed on a dry weight basis the mean difference was not significant. Similar relations were also found for the manganese and calcium content of leaves with respect to method of expressing the results. No significant difference was found in the chemical composition of recent terminal branch growth from chlorotic and green trees. Iron content of fruit from peach and pear trees was appreciably greater for green than for chlorotic trees. Green leaves contained more iron soluble in *N* HCl than did chlorotic leaves. Hydrochloric, acetic, and formic acid solutions each extracted appreciably more ferrous iron from green leaves than from chlorotic leaves. Although these acids are able to reduce some ferric iron in the presence of glucose and starch, the results are considered sufficiently distinct to indicate a greater quantity of ferrous iron in the green leaves. Extracts and sap from green leaves had a greater capacity to reduce ferric iron than did similarly obtained extracts and sap from chlorotic leaves. The results obtained indicate that soil and plant conditions associated with chlorosis are more conducive to the maintenance of iron in insoluble ferric compounds than are conditions in both soils and plants associated with normal green leaf development."

1114. GREEN, D. E. 634.1/7-2.111
Weather injuries to fruit.
J. roy. hort. Soc., 1944, **69**: 175-8.
An account of observations made at Wisley on frost damage to bark, flowers and apple fruits, on sun scald and hail injury. Only in the case of frost injury to bark could any measures be recommended which would mitigate the damage. They consist in closing the cracks by nailing the bark down with large-headed tacks, and after-treatment. Although sun scald of plums has not been recorded at Wisley and was not mentioned by Moore and Rogers (*Gdnrs' Chron.*, 1942, 112: 166-7; *H.A.*, 13: 92), samples received from Kent, Surrey and Worcestershire indicate that this malady occurs in England also in plums. Storage trials with hail-injured apples showed that the keeping quality of the fruits was not affected, the hail bruises being sealed off by layers of corky cells. A number of photos illustrate the damage sustained.

1115. ANON., AND EDITOR FRUITGROWER. 632.111: 634.1/7
Protection from spring frost damage.
Fruitgrower, 1944, **98**: 10 and 11.
It would appear from this summary that a concentrated attack on all the different aspects of frost damage and protection has yet to be made in this country. Preparatory investigations have been made into air currents and cold air drainage but apparently little on actual preventive measures, such as heating, smudging or the production of artificial fog. The present article contains a translation of a German manufacturers' description of a fog generator and the application of the method.

1116. Zaliwski, S. 632.111: 634.1/2
Ermittlungen über die Frostschäden im Obstbau des Generalgouvernements nach dem Winter 1939/40. (**Determination of the frost damage to fruit trees in Poland after the winter of 1939-40.**)
Ber. landw. Forsch. Anst. Generalgouvernmt **1**, 1943, pp. 67-75, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 11.

It is estimated by the German Agricultural Experiment Station in Poland that about 10 million fruit trees were killed in the country during the winter 1939/40. Of the common varieties Landsberg and Boiken only 15% and 9% respectively survived. The damage to Cox's Orange Pippin amounted to 90%. Antonowka, White Transparent, Lithuanian Pippin and some other varieties proved generally resistant. Pears, sweet cherries and plums were wiped out almost completely, whilst acid cherries on their own roots, not on bird cherry, suffered little.

1117. Kessler, W., and Ruhland, W. 632.111
Über die inneren Ursachen der Kälteresistenz der Pflanzen. (**The internal causes of cold resistance in plants.**)
Forschungsdienst, 1942, Bd. **16**, Sonderheft, pp. 345-51, from abstract *Gartenbauwiss*, 1943, Vol. **18**, abstr. p. 5.

It was found that in a state of high cold resistance the protoplasm is characterized by a considerable viscosity, associated with a condition of swelling. The cold resistance decreases as soon as a growth tendency asserts itself. Of protective value is everything that (1) keeps down the amount of ice formed in the cell and (2) prevents the inundation of the protoplasm with water when the ice melts. The relation between resistance and activation of development is discussed.

1118. Janisch, E. 581.08
Die Benutzung von Klimaanlagen in der Pflanzenschutzforschung. (**The use of climate chambers for plant protection work.**)
Z. PflKrankh., 1941, **51**: 218-40, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 63.

The production of a desired climate at the Biologische Reichsanstalt für Land-u. Forstwirtschaft, Berlin-Dahlem, is described.

1119. Blagoveshchensky, E. N. 631.617
Natural store of water in the soil of scrub deserts of Central Asia as related to the problem of their restoration.
C.R. Acad. Sci. U.R.S.S., 1943, **38**: 141-4, bibl. 10.

The author compares the *Haloxylon*-covered deserts of Central Asia to the mallee scrubs of Australia, both dependent for their vegetative cover on xerophilous shrubs. His investigations show that ordinarily three sources of water must be available for such plants to live, viz. (1) the downward travelling water of precipitation, (2) water absorbed from the water vapour from the air by the overdried soil surface and (3) water formed by the sublimation of moisture from ground waters.

1120. Moshkov, B. S. 612.014.44: 632.112
Relationship between photoperiodism and drought resistance of perennial plants.
C.R. Acad. Sci. U.R.S.S., 1939, **22**: 184-6.

Evidence is given from experiments with cherry (*Prunus besseyi*), locust (*Robinia pseudacacia*), lemon and tea plants, in which the young seedling plants were submitted to wilting, that length of day conditions considerably affect the resistance of plants to drought. Thus the highest resistance to drought was shown by lemon under short (8-10 hour) day conditions and by cherry under long (14 hour) day conditions. It is suggested that reiterated wilting might be used to increase indirectly resistance to cold in irrigated drought districts of middle Asia.

1121. Johansson, E. (Larsen, H.) 632.183: 634.1/2
Läplanteringar vid fruktodling. (**Planting orchard windbreaks.**)
Fruktodlaren, 1944, Nr. 1, pp. 12-3.

The article is a summary of a Danish paper by H. Larsen (*Erhversfrugtavleren*, 1944, Nr. 5) emphasizing the desirability of wind screen plantings for orchards in somewhat exposed localities. At Blangstedgaard on Fyen an experimental plot was divided into 36 m. broad strips running parallel with the wind screen, the annual yields of the strips nearest to and farthest from the screen being 627 and 483 kg. per 100 m² respectively for the period 1922-31 [size of the plot, kind of tree, fruit and shelter not given.—Ed.]. Proper shelter belts should be planted only at very windy sites, whilst hedges would give sufficient protection in moderately exposed places. From his results obtained at Blangstedgaard Larsen calculates that hedges against west and east winds planted at a distance of 240 m. would have increased the yield of the experimental orchard by 49 kg. per 100 m² for the period 1922-31 and by 45 kg. for the period 1932-35. With the hedges only 86 m. away an increase of 93 and 58 kg. might have been expected for the two periods. The erection of windbreaks at 70 m. distance and the grubbing of every other hedge 10 years after planting, when from 8 to 10 m. high, would appear as the optimum plan under the circumstances. Trials at a more exposed locality at Spangsbjerg on Jutland showed that in this case a distance between the hedges of 25-30 m. and later of 50-60 m. would be appropriate. The lay-out of the orchard has to be planned in such a way that the distance between the trees remains uniform after the removal of alternate hedges. For hedges against north and south winds a distance of 100-300 m. may generally be regarded as sufficient. Pyramid poplar and possibly myrobalan are recommended for temporary hedges to be scrapped after 10 years, hawthorn and hornbeam being suggested for the more permanent screens. Experiences in Scania show that *Populus berolinensis* (*P. certinensis*) is a very suitable species for small holdings.

1122. Stanley, W. M. 632.8
Soviet studies on viruses.
Science, 1944, **99**: 136-8, bibl. 24.

A brief historical survey of recent virus work in Russia, delivered as an address at the Congress of American-Soviet Friendship, held in New York in November 1943.

1123. Palmiter, D. H., and Hildebrand, E. M. 634.25-2.8
The yellow-red virosis of peach: its identification and control.
Bull. N. York St. agric. Exp. Stat. **704**, 1943, pp. 17.

Yellow-red virosis can be first recognized on the peach by the fact that during midsummer the leaves on the diseased parts turn yellow and display purplish-red areas which become brittle and fall out, leaving irregular holes, the leaves themselves also being shed. Infected branches may bear mummies but no good fruit. In the diseased chokecherry the foliage is strikingly bright yellow to red from mid-June to the first frosts. Infected plants become increasingly weaker. No peach varieties have been found resistant when inoculated with diseased buds. Other stone fruits which can be artificially infected are nectarines, apricots, almonds and wild plums and cherries. The only check is the removal of all chokecherries before the disease appears.

1124. Louw, A. J. 634.11-2.8
Mottle leaf or mosaic chlorosis of apples.
Fmg S. Afr., 1944, **19**: 32-4, 44.

Mottle leaf of apples is widespread in South Africa and incidence appears to be growing in extent. The percentage of affected trees is particularly high in Golden Delicious orchards, but none of the commercial varieties seems to be resistant to the virus. The eradication of all diseased trees being quite impracticable, the only counter measure suggested consists in excluding the disease from nurseries by

carefully selecting bud wood and scions from healthy trees. The same precautions are necessary when topworking trees.

1125. MAIER, W., AND MITTMANN-MAIER, G. 634.8: 581.192: 577.15.04
Untersuchungen über den Wuchsstoffgehalt gesunder und reisigkranker Reben. **(The content of growth substances in healthy vines and those affected with reisig disease.*)**
Wein u. Rebe, 1942, **24**: 109-24, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 66.
At Geisenheim on Rhine the tips of vigorous vine shoots were found to contain a much greater amount of growth substances than those of weak shoots. The shoot tips of vines severely dwarfed by reisig disease from the Ahr Valley showed a greatly reduced content of growth substances, about one-third of that of healthy vines. It is tentatively suggested that the poor grafting and propagation qualities of dwarfed vines may be due to their low content of growth substances.

1126. KREUTZBERG, V. E. 634.574
A new virus disease of *Pistacia vera*.
C.R. Acad. Sci. U.R.S.S., 1940, **27**: 614-5.
Particulars are given of a virus disease of pistache which affects branches, leaves, fruit and seed. The ultimate stage as regards yield is the formation of dark green, proliferated panicles appearing yearly instead of fruits. Various chemicals have been applied in vain, but removal of infected branches and cleaning and trimming of crowns appears to offer a fair measure of control. There is evidence that the disease is seed borne and the greatest care is essential in seed and vegetative propagation.

1127. STEVENS, N. E. 634.76-2.8
Cranberry false blossom in relation to flooding water.
Phytopathology, 1944, **34**: 140-2.
Cranberry false blossom appears to be inhibited by alkaline flooding water. Alkaline marshes are not very productive of fruit but, if the psychological difficulties of selling plants from unproductive sites could be overcome, they would be useful as nurseries for the production of uncontaminated plants.

1128. COSTA, A. S. 632.8: 632.53
Multiplication of viruses in the dodder, *Cuscuta campestris*.
Phytopathology, 1944, **34**: 151-62, bibl. 8.
The role played by dodder, *Cuscuta campestris*, in the transmission of ordinary tobacco-mosaic virus, aucuba-mosaic virus, cucumber-mosaic virus and cranberry false-blossom virus was studied at the Rockefeller Institute for Medical Research, Princeton, N.J. Transmission through dodder was obtained, under certain conditions, with the ordinary tobacco-mosaic and aucuba-mosaic viruses and, to a high percentage, with cucumber mosaic-virus. Dodder juice was found to have an inhibitory effect on the three viruses as measured on *Nicotiana glutinosa* and *Vigna sinensis* var. Black respectively. Dodder stems containing cucumber mosaic virus produced local lesions in *Vicia faba*, when attached to this plant. There is strong evidence that the cranberry false-blossom virus multiplies in the dodder. Dodder stems successfully inoculated with cucumber-mosaic virus showed distorted growth to a varying degree.

1129. OSBORN, E. M. 633.88
Antibacterial substances in green plants.
Nature, 1944, **153**: 598, from *Brit. J. exp. Path.*, 1943, **24**: 227.
Reference is made to recent work whereby some 2,300 different green plants were tested for the occurrence of antibacterial substances in their tissues. Antibacterial substances have been found in 63 genera belonging to 28 families, sometimes distributed throughout the plant as in *Asarum europeum*, in others more restricted as in cabbage, *Brassica oleracea*, where the substance is mainly found in the seed or in *Magnolia* where it is confined to the bark. The bacteria used in the test were *Staphylococcus aureus* and *Bacterium coli*. A full list of the species tested and the results may be obtained from the School of Experimental Pathology, Oxford.

1130. RIPPEL, K. 576.85: 581.14
Nochmals zur Frage des Vorkommens von Mikroorganismen in gesunden pflanzlichen Geweben. **(The presence of micro-organisms in healthy plant tissues.)**
Planta, 1941, **32**: 391-4, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 43-4.
A careful re-examination of a number of horticultural plants confirmed the author's previous results that no micro-organisms are present in healthy tissues.

1131. HENRY, B. W., RIKER, A. J., AND DUGGAR, B. M. 577.16: 632.314
Thiamine in crown gall as measured with the *Phycomyces* assay.
J. agric. Res., 1943, **67**: 89-110, bibl. 49.
It appears from these trials, in which mainly Bonny Best tomato plants were used for the inoculations, that thiamine alone does not have a causal rôle in crown gall (*Phytomonas tumefaciens*) initiation or development beyond that of any necessary food or growth factor transported to or produced in that area of meristematic activity.

1132. STAPP, C. 632.314
Der Pflanzenkrebs und sein Erreger *Pseudomonas tumefaciens*. XII. Mitteilung: Die Wirkung von Äpfelemanation auf Erreger und Wirtspflanze. **(Crown gall and its causal organism *Pseudomonas tumefaciens*. XII. The effect of apple emanations on causal organism and host plant.)**
Zbl. Bakt., 1943, *Abt. II*, **106**: 167-71, bibl. 12.
It is shown that the apparent crown gall-promoting effect of apple emanations observed by V. Nábelek (*Z. f. Krebsforsch.*, 1939, 48: 391-9) is produced by the moist atmosphere under a glass cover.

1133. JEFFERS, W. F., AND WALKER, E. A. 634.25-2.3
Bacterial spot of peaches [*Xanthomonas pruni*] as occurring in Maryland.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 41-3, bibl. 4.
Xanthomonas pruni causes superficial but extremely disfiguring lesions to the peach fruit. Infection is introduced in buds of nursery stock. All young trees should therefore be sprayed with zinc sulphate and lime, which also affords good results on the disease in older trees. This is added to the sulphur fungicide spray and applied at the shuck stage and 5 or 6 times afterwards at 10-day intervals.

1134. KOVALEV, N. V. 634.1/2-1.521.6
Immunity to fungal diseases among fruit trees. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 176-9.
Wild species of *Malus*, *Pyrus* and *Cydonia* from Eastern Asia, and of *Malus* from North America were found to be immune to the fungal diseases of the genera *Monilia*, and *Fusicladium*, and nearly immune to those of *Phyllosticta* and *Gymnosporangium*. The moist climate in the regions mentioned enabled the species to evolve immune varieties, with the exception of *Pyrus ussuriensis*, which was subject to infection by *Fusicladium* even in the northern part of Eastern Asia, though not to such a marked degree as in the warm moist parts of China. The same species growing wild in the dry regions of Southern China and Central Asia were

* See also *H.A.*, 6: 479, 9: 465, and 14: 573.

affected by all the diseases referred to in the present article. In regions where the climate was intermediate, the incidence of the diseases was variable, being more pronounced in wet than in dry years but rarely sufficient to give rise to immune varieties resulting from the drastic elimination of weaklings. Breeders are recommended to seek for the character of resistance to the fungal diseases among immune specimens in the moist regions.

1135. BERKELEY, G. H. 632.4
Root-rots of certain non-cereal crops.
Bot. Rev., 1944, **10**: 67-123, bibl. 347.

The losses in crop plants from root-rots caused by soil-inhabiting fungi has received much attention in recent years. In the *Botanical Review* series P. M. Simmonds has recently summarized the work on root-rots of cereals, and a more general account by S. D. Garrett has appeared as a Technical Communication of the Bureau of Soil Science, Harpenden. G. H. Berkeley now reviews the work on root-rots of the more important non-cereal crops. The soil-environment is very complex, and the roots, from their situation, do not so readily lend themselves to treatment by fungicides as the above-ground parts, so that the control of such rots is not generally easy. Dr. Berkeley has himself worked on these problems, with special reference to small fruits, and this publication can be taken as a good general survey of the work that has been done on the root-rots of crops other than cereals. A wide range of host plants is involved, but, from the scope of the article, each plant is treated briefly, and the section referring to the many individual crops affected occupies only 13 pages. Other sections deal with temperature in relation to root-rot, reaction of the soil, water content of soils, control, types of root-rots, and trends in research. The author's comments, and the many references to papers already published, will be found most useful to those workers who are interested in the ravages caused by the fungi of the soil. One statement on p. 69, "In Europe *A[rmillaria] mellea* attacks primarily forest and shade trees", may be questioned by European horticulturists. In a recent bulletin, "Diseases of crop plants, a ten years' review (1933-1942)", by W. C. Moore (*Bull. Minist. Agric.* 126) it is shown that this fungus during the period of the review has been found attacking more than 40 different species of crop plants and ornamental shrubs, including particularly tree fruits, and also bush fruit plants. One possible way by which disease-causing soil organisms may be carried from one region to another is in the soil adhering to the roots of young trees, rootstocks, bulbs and seedlings. This seems to be a feature of the general problem that has received little attention up to the present, since there is no mention of it in the section entitled "Control".

H.W.

1136. KEITT, G. W., AND MOORE, J. D. 634.11-2.42
Apple scab control. Experiments with ground and tree spraying in 1943 [Wisconsin, U.S.A.].
Wis. Hort., 1944, **35**: 139-40.

Fallen leaves of scab-infected apple trees produce an abundant supply of ascospores to carry on the disease in the following season. Spraying the orchard floor with Elgetol 1 in 200 applied just before budbreak at 600 gal. per acre has been found to reduce the effective supply of ascospores by about 95% to 99% in orchards that were not cultivated during the period of ascospore discharge. The result was that the severity of scab outbreak from budbreak to some 2 weeks after petal fall was reduced by about nine-tenths. Experiments were made to discover suitable tree-spray programmes in ground-sprayed orchards. In general lime-sulphur 1-50 was applied 3 times pre-blossom followed by 5 applications of various materials after bloom with lead arsenate in all applications. In terms of McIntosh fruit scabbed at harvest the results were (1) lime-sulphur 1-60 1%; (2) lime-sulphur 1-75 2%; (3) flotation sulphur 8-100 plus lime 1-100 9%; (4) Kolofog 6-100 12%; (5) Mike sulphur 5-100 plus lime 1-100 7%; (6) Fermate 1-100 plus lime 1-100 4%. Severe foliage injury occurred on all plots receiving lime-sulphur throughout the season, this being greatly reduced on plots receiving the substitute materials, and these plots also outyielded the lime-sulphur plots.

1137. HAMILTON, J. M., AND PALMITER, D. H. 632.4: 634.1/2
Apple scab, cedar apple and quince rust, fruit russet and cherry leaf spot control [in N. York] in 1943.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 27-34.

The spring was marked by almost continuous rain. Under such conditions the most effective wettable sulphurs proved superior to liquid lime-sulphur in control of disease. Fermate, unlike sulphur, was almost completely effective against cedar apple and quince rust. Fruit russet was found to be due to spray injury. Generally speaking spray mixtures containing copper were effective against leaf spot, whereas the sulphur materials were not.

1138. MUNDKUR, B. B., AND KHESWALLA, K. F. 634.11-2.4
A canker of apple trees in Mysore.
Ind. J. agric. Sci., 1943, **13**: 397-8, bibl. 7.

This note records the occurrence of *Sphaeropsis malorum* Berk. [*Physalospora mutila* (Fries) N. E. Stevens] on imported apples in Mysore. It also shows that the previous records of the occurrence of this fungus in India are based on error. [Authors' summary.]

1139. MAIER, W. 634.21-2.42
Über ein Zweigsterben der Aprikosen als Folge von Monilia-Fruchtfäule. **(The dying back of twigs in apricots affected with monilia rot.)**
Z. PflKrankh., 1942, **52**: 91-107, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 64-5.

In observations made at Geisenheim it was found that apricot varieties vary in resistance to *Monilia cinerea* which causes the dying back of twigs in spring. Among the fifteen varieties, which proved only slightly susceptible, were Goutte d'Or, Ambrosia and others. Six varieties described as very susceptible include Apricot de Nancy and Moorpark. Nine varieties were resistant to a medium degree. The control of the disease is rendered more difficult by the fact that the dying back of twigs in summer is caused by another species, *M. fructigena*. A plea is made for the breeding of resistant varieties.

1140. ANON. 634.22-2.42
Pungsjuka på plommonträd. **(A *Taphrina* disease of plums.)**
Flygbl. Växtskyddsanst., Stockh., **55**, 1940, pp. 3.

The symptoms of a plum disease and the life history of the causal fungus, *Taphrina pruni*, are described. In many cases losses in Sweden in untreated orchards rose to 90%, particularly with yellow plums and varieties of the prune type. Treatment which has given good results in Norway and is therefore recommended is spraying with 2-3% copper sulphate or a strong lime-sulphur solution just before flowering. The importance of increasing the resistance of the tree by cultural measures and of removing all infected parts is emphasized. Although the *Taphrina* species causing a similar disease in bird cherries has not yet been identified, it is suggested that infected fruits should not be left near a plum orchard.

1141. JEFFERS, W. F., AND DARROW, G. M. 634.75-2.411
The red-stele resistant Temple strawberry.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 43-4.

Temple which is a cross between Aberdeen and Fairfax has been grown in red-stele infected soil since 1938 and has shown freedom from red-stele and excellent fruit qualities. Other desirable characters in this cross are detailed.

1142. PERLBERGER, J. 634.2-2.452
The rust disease of stone fruit trees in Palestine. [Hebrew, English summary 22 l.]
PERLBERGER, J., AND PALTI, J.
Spraying trials for the control of the rust disease of stone fruits. [Hebrew, English summary 16 l.]
Bull. Rehovoth agric. Exp. Stat. **34**, 1943, pp. 16.

In Palestine plum rust (*Puccinia pruni spinosae*) may develop in all parts of the country during the winter, but in summer it is limited to regions with relatively lower temperature and higher atmospheric humidity. Its effect on stone fruits is premature defoliation. Its occurrence in spring is rare and it does not appear on the fruits. Its development is further restricted by the parasitic fungus *Darluca filum* which is found on the sori of the rust fungus. Two years' spraying trials show that the best time for spraying to control the disease is summer and early autumn, and applications should be made at intervals of approximately 10-18 days. A lime-sulphur spray, sulfinette, 33° Be at a concentration of 1: 60, gave the most satisfactory control and prevented premature leaf fall. A weak bordeaux was not so good.

1143. DU PLESSIS, S. J. 634.8-2.48
Anthracnose of vines and its control in South Africa.
Sci. Bull. S. Afr. Dep. Agric. **216** (*Stellenbosch Ser.* **40**), 1940, pp. 47, bibl. 54, 6d.

A survey of the literature on anthracnose of vine (*Gloeosporium ampelophagum*) is followed by a note of its life history and distribution in S. Africa. The rest of the bulletin is concerned with control measures and control experiments at Elsenburg and elsewhere. Both dormant and summer treatments are applicable and if properly carried out they should suffice to eradicate the disease from S. African vineyards. There would appear to be ample choice of effective fungicides. Proof is absent to justify the preference of spraying to dusting.

1144. LOUW, A. C. 632.48: 588.427
Studies on *Septoria passiflorae* n. sp. occurring on passion fruit with special reference to its parasitism and physiology.
Sci. Bull. S. Afr. Dep. Agric. **229** (*Stellenbosch Ser.* **44**), 1941, pp. 51, bibl. 29, 6d.

Practically the whole bulletin concerns the nature and behaviour of this new disease of passion flower (*Septoria passiflorae* n. sp.) found at French Hoek and Stellenbosch. As regards control it is suggested that dusting with copper fungicides at 10 to 14 day intervals, systematic pruning and training of vines and removal and destruction of infected material should prove effective.

1145. ZOBRIST, L., CONRAD, R., AND ZOGG, H. 634.23-2.4
Untersuchungen über die *Gloeosporium*-Fruchfäule an Kirschen. (***Gloeosporium* rot of cherries.**)
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 145-51, 161-9, bibl. 3.

A rot of ripening cherries caused by *Gloeosporium fructigenum*, and of economic significance in north-western and eastern Switzerland, was studied by the authors. Symptoms and development of the disease, which may reduce the yields by 40-60%, are described. Infection experiments showed that the fungus is able to attack fruits not previously injured. While in one district incidence occurred in all varieties, Early Luxemburg suffered most. As a rule, injury is greatest in soft-fleshed varieties. Although detailed control measures cannot yet be recommended, preliminary results suggest that two copper-containing, post-blossom sprays will control the disease.

1146. HANSEN, H. N., AND RAWLINS, T. E. 634.63-2.42
***Cercospora* fruit and leaf spot of olive.**
Phytopathology, 1944, **34**: 257-9.

A disease of olive occurring in California caused by *Cercospora cladosporioides* Secc. is described. The symptoms are purple spots on green olives and failure of the stem half of the fruits to blacken. Damage was confined to fruits that are to be pickled as green olives.

1147. DAY, L. H., AND TUFTS, W. P. 634.1/2-1.541.11-2.651.3
Nematode-resistant rootstocks for deciduous fruit trees.
Circ. Calif. agric. Exp. Stat. **359**, 1944, pp. 1-16.

Summarizes 15 years of experimentation designed to adapt deciduous fruit trees to soils heavily infested with root-knot nematodes (*Heterodera marioni*). Under conditions of these trials, seedlings of 48 varieties of apricot were practically immune. Seedlings of 180 peach and 44 nectarine varieties were tested. The seedlings of several varieties showed considerable resistance, though none was immune. Ten years of orchard trial indicate that seedlings of Shalil, Bokhara and Yunnan are promising as rootstocks for peaches and almonds in nematode-infested sandy soils. Myrobalan plum seedlings were generally susceptible, though several were immune. Marianna plum and several vigorous seedling selections of this hybrid are immune. All the above immune plums propagate readily by stem cuttings. Results of tests of a number of other plum species, varieties and hybrids are reported. Mazzard cherry and Stockton morello (grown from root cuttings) were immune, and mahalab cherry seedlings were lightly affected. Seedlings of all the common almond varieties were very susceptible, though a few individual seedlings were not affected. Seedlings of Winter Nelis pear were lightly affected. Delicious apple seedlings and several quince varieties, grown from cuttings, were immune. Seedlings of English (Persian) and Northern California black walnuts were moderately affected.

L.H.D.

1148. HEY, G. L. 632.654.2: 634.1/2
Fruit tree red spider.
Fruitgrower, 1944, **97**: 66, 101-2, 199-200, 313-4, 387-8, 423-4.

The life history and control of fruit-tree red spider, now known as *Oligonychus ulmi* (*Paratetranychus pilosus* in U.S.A.) is the subject of a detailed study. Particular attention is paid to the effect of various summer washes. The main limit to the efficiency of these washes is the impossibility of wetting more than about 70% of the under surface of the leaves in spite of every possible alteration and adjustment of spray nozzle, pressure, cone of spray, etc. The author considers that for this reason summer washes at best are only a temporary check and the results seem seldom worth while. Manufacturers of spraying equipment should be made acquainted with these facts with a view to future improvements. Lime-sulphur 1: 100 plus wetter, or straight derris extract were inefficient. The best results were obtained by derris in oil or derris powder plus oil which will kill any spider touched and a proportion of the summer eggs. The oil content of the diluted wash should be under ½% to avoid foliage injury. With winter spraying best results were obtained with a straight petroleum oil wash following a tar oil application or a single application of thiocyanate in petroleum wash. These washes kept the trees free until August, but did not prevent winter egg laying in quantity from July onwards. Early application is best for reasons both mechanical and physical but the questions are still unsettled as to the stage at which the egg becomes most vulnerable (if there is such a stage) and the length of time the oil needs to be in contact with the egg to kill it.

1149. SNAPP, O. I., AND THOMSON, J. R., Jr. 634.25-2.752
Experiments with oils and lime-sulphur for the control of the San José scale on peach trees in the south.
Tech. Bull. U.S. Dep. Agric. **852**, 1943, pp. 12, bibl. 4.

The results of work on San José scale at Fort Valley,

Georgia, between 1929 and the end of the 1941-2 season are here reported. Scale control is much reduced if spray oils have a volatility of 5% or more. Mineral oil emulsified with casein and ammonia is just as effective as that emulsified with potash-fish-oil soap. Results of tests show that there is an adequate margin of safety to peach trees in the normal recommendation of 3% lubricating oil emulsion. This proved slightly more effective than lime-sulphur 1-7, though the latter proved better than was expected in its after-effects.

1150. BRANN, J. L. 634.1/2-2.752
The scurfy scale [*Chionaspis furfura*] and its control in the Hudson Valley.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 157-64.

The scurfy scale is more widely spread in N. York orchards than is generally realized. Its life history and control are here considered. The control recommended is spraying very thoroughly with a 4% dormant or a 3% delayed dormant, paraffinic base oil, emulsified with ½ lb. commercial blood albumin (2 oz. actual blood albumin). Further, the use of ½% summer oil plus ½ pint nicotine sulphate as recommended for the control of second brood codling moth will reduce the number of scales and prevent them from infesting the fruit.

1151. OSSIANNILSSON, F. 634.23-2.753
Massuppträdande av häggbladlus i Ångermanland 1943. **(Mass incidence of the bird cherry aphid in Angermanland in 1943.)**
Växtskyddsnotiser, 1944, Nr. 2, pp. 30-1.

By collecting information on a large scale it is hoped to obtain more detailed data on the life of the bird cherry aphis, *Rhopalosiphum padi*, preliminary to controlling it, and on the relation between the incidence of this pest on bird cherries and cereals.

1152. WIESMANN, R., AND FENJVES, P. 634.23-2.77
Weitere Versuche zur Bekämpfung der Kirschfliege *Rhagoletis cerasi* L. mit Gesarol im Jahre 1943. **(New trials on the control of the cherry fruit fly with Gesarol in 1943.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 131-7.

Continuing their work on cherry fruit fly control with Gesarol (*ibid.*, 1942, 52: 232-50; *H.A.*, 14: 119) the authors examined the following questions in 1943: (1) The relative effectiveness of 2% and 1% solutions; (2) optimum timing and number of applications; (3) the possibility of obtaining greater control by spraying the ground under the trees. The results showed that 1% Gesarol is satisfactory if the first treatment is carried out during the first days of June and the second 14-16 days later. Spraying of the soil did not improve the results. The trials are being continued in 1944.

1153. HAYWARD, K. J. 016: 632.77: 634.1/8
La bibliographia sobre las moscas de las frutas. **(A fruit fly bibliography.)**
Bol. Est. exp. agric. Tucuman **31**, 1940, pp. 42.

Some 900 references to articles on fruit flies are listed, nearly all published since 1910.

1154. DEAN, R. W. 634.11-2.77
The apple maggot [*Rhagoletis pomonella*].
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 186-91.

Control is usually combined with that of codling moth, the drawbacks to this being the danger of excessive residues entailed and the slowness with which the control kills the fly. Rotenone-oil dusts and phenothiazine sprays offer the greatest promise as arsenic substitutes for the control of the pest.

1155. BRANN, J. L. 632.78: 632.951
Evaluation of codling moth insecticides.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 170-9.

Tests with a large number of insecticides are discussed by the author. He finds that the cryolites, Lethane 60 and Spray Kast are unlikely to increase the effectiveness of control. The residues resulting from phenothiazine and tank mixed bentonite at present preclude the use of these materials. The most effective schedule for the more heavily infested area of the Hudson Valley is one in which the first two lead arsenate covers are fortified with nicotine followed by a third, fifth and sixth of nicotine and oil and a fourth of lead arsenate plus a suitable spreader-sticker.

1156. HAMILTON, D. W. 632.78
Report of progress with dusting for codling moth control.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 180-6.

Dusts for codling moth are still in the experimental stage and are at present more expensive than sprays for the same results. It is noted that 2% of 100 viscosity dormant oil added to lead arsenate-sulphur dusts improved their adhesive qualities.

1157. WIESMANN, R. 634.8-2.78
Der Heu- und Sauerwurm (Traubenwickler) und seine Bekämpfung. **(Vine moths and their control.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 193-8, being *Flugschr. Versuchsanst. Wädenswil* **19**.

The life histories of the vine pests *Clysia ambiguella* and *Polychrosis botrana* and their control in Switzerland are described.

1158. NEL, R. I. 632.78: 632.96
Biological control of the codling moth in South Africa.
J. ent. Soc. S. Afr., 1942, **5**: 118-37, bibl. 25.

Of all foreign species parasitic on the codling moth hitherto introduced *Ascogaster quadridentatus* is the only one known to have established itself in S. Africa. *Ephialtes caudata* and *Cryptus sexannulatus* have been recently imported and are being satisfactorily reared in the insectary. Since lead arsenate spraying appears to suppress almost completely most of the codling moth parasites, it would appear necessary temporarily to omit spraying in cases where it is proposed to change from chemical to biological methods of control. Methods suggested for reducing crop losses to a minimum during this change over are the mass liberation of larval and pupal parasites, either alone or in conjunction with the application of fixed nicotine sprays which appear to be relatively non-toxic to the parasites. Probable effects of non-spraying on other pests are discussed.

1159. ALLEN, H. W. 634.25-2.78-2.96
Relation between parasitization of twig-infesting larvae of the oriental fruit moth and subsequent infestation of ripe peaches.
J. agric. Res., 1943, **67**: 81-8, bibl. 5.

Observations in 1937-1939 in 51 orchards in peach growing areas of Virginia, West Virginia, Maryland and New Jersey supported previous evidence from New York and New Jersey that parasitization of twig-infesting larvae during second-brood infestation is an important factor in controlling the infestation of ripe peaches by *Grapholitha molesta*, and indicated the desirability of continued widespread liberation of these parasites.

1160. RICE, P. L. 634.11-2.78 +2.753
Two apple pests new to Delaware growers.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 37-41, bibl. 4.

The pests are the pistol case-bearer (*Coleophora malivorella*) and the Comstock mealybug (*Pseudococcus comstocki*). For the former lead arsenate in the codling moth spray generally suffices. The best hope for controlling the mealybug would appear to lie in the use of counter parasites, e.g. a *Pseudaphycus* sp. already introduced.

1161. IMMS, A. D. 632.51: 632.96
Control of St. John's Wort in Australia.*
Nature, 1944, **153**: 785.
It is estimated that 250,000-400,000 acres in Victoria are infested with *Hypericum perforatum*. The weed is also widespread in large areas of New South Wales and it occurs as well in South Australia, Tasmania and Western Australia. An account is given of various attempts to control the plague by the liberation of *Hypericum*-feeding insects. More recently the Buprestid beetle *Agrilus hypericis* and two species of the Chrysomelid beetle, *Chrysolina gemelata* and *C. hyperici*, all introduced from southern France, have become established in some areas and give ground for confidence.

1162. SCOTT, R. H. 632.55.722
Life history of the wild onion and its bearing on control.
Agriculture, 1944, **51**: 162-70, bibl. 5.
A detailed study has been made of the complex life history of the wild onion (*Allium vineale*) with a view to finding an effective way of destroying this weed. The investigations were carried out in the neighbourhood of Cambridge, where the plant is troublesome on gault and heavy clay soils. The author comes to the conclusion that repeated cultivations in mid-February at close intervals would injure the weed during the period of its greatest susceptibility. Since, however, such cultivation will be impracticable just on the most heavily infested clay soils, growers are recommended to have recourse to a consistent removal of the fruiting heads. In view of the long dormancy period of the minor offset bulbs it is estimated that the eradication of the weed by the treatment suggested would require six years.

1163. FRAZIER, J. C. 632.51
Nature and rate of development of root system of *Centaurea picris* [Russian knapweed].
Bot. Gaz., 1944, **105**: 345-51, bibl. 7, being *Contr. Kans. agric. Exp. Stat.*, **454**.
This is the third in a series of reports on the growth habits of noxious perennial weeds of central U.S.A. undertaken by the Kansas Agricultural Experiment Station. Previous reports deal with *Convolvulus arvensis* (*H.A.*, 13: 692) and *Lepidium draba* (*H.A.*, 14: 635 noted only).

1164. GUNDERSON, H., AND DECKER, G. C. 632.693.2
Rodent pests of Iowa and their control.
Bull. Ia agric. Exp. Stat. **P43**, 1942, pp. 423-36.
Hints are given on the control of ground squirrels, woodchucks, pocket gophers, rats, mice, tree squirrels, rabbits and moles.

1165. ARTIGALA, J. 632.963
Protégeons les oiseaux utiles. **(Let us protect useful birds.)**
Rev. Hort. Agric. Afr. N., 1941, **45**: 83-6, from *Réveil Agricole*, undated.
Some particulars are given of the quantity of insects consumed daily by the various insectivorous birds of Southern France and North Africa. Suggestions are made for the more adequate protection of these birds.

1166. MILLER, T. C. 632.682
An electric bird scarer.' A new use for the electric fence.
J. Dep. Agric. W. Aust., 1943, **20**: 309-13.
The two wires to be electrified are stretched over the tops of the trees and provided at intervals with wooden perches either supported on a pole from the centre of the tree or suspended from wires. The live wires run along and are attached to the perches sufficiently close together for a perching bird to contact them both, but far enough apart to prevent the current from jumping the interval. In the layout described the two main wires are run along the existing orchard fence posts, and the wires to be electrified along each row of trees at right angles to the mains. A 6-volt battery will electrify 20 miles of fencing for about 3 months without recharging. The birds are not killed but sufficiently shocked to scare them away from the protected parts of the orchard. Information is given as to apparatus required and method of installing. The experiments were made in Western Australia where cockatoos and parrots especially cause heavy damage to apples. In one instance 20 black cockatoos destroyed apples to the amount of 40 cases in 10 minutes. So far the method is still in the experimental stage.

* See also *H.A.*, 14: 610.

1167. MINISTRY OF AGRICULTURE, LONDON, AND DEPARTMENT OF AGRICULTURE FOR SCOTLAND. 632.951 + 632.952
Proprietary products for the control of plant pests and diseases. List of officially approved products. 1944, pp. 3.
The two departments started in 1943 a voluntary scheme (see *Agriculture*, 50: 331) for the official approval of insecticides and fungicides marketed under proprietary brand names for the control of plant pests and diseases. The proprietary brand names of products so far approved under this scheme together with the names of the firms concerned are given in this list. The groups considered are: lead arsenate powders, lead arsenate pastes, lime-sulphur washes, miscible tar oil winter washes, stock emulsion tar oil winter washes and organo-mercury dry seed dressings. The purchaser will be able to recognize an approved product by the official label on the container. The list will be issued periodically in further editions of this leaflet and any additions made to the list before the new edition will be made known in *Agriculture*.

1168. ZÄCH, C. 632.951.8
Über Winterspritzmittel und Anforderungen an deren Qualität. **(Winter sprays and the standard of quality required.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 37-41.
The article is the text of a paper read to a meeting on fruit disease and pest control held at Wädenswil in January 1944. The proprietary sprays available in Switzerland are divided into three groups: (1) fruit tree carbolinea (normal and emulsified), (2) dinitrocresol preparations, (3) combined tar oil-dinitrocresol preparations. The supply position and the standard of quality required are discussed.

1169. DIERICK, G. F. E. M. 632.951.8
Die ovizide Wirkung von Winterspritzmitteln. Nach Laboratoriumsversuchen. **(The ovicidal effect of winter sprays. Laboratory tests.)**
Thesis, Amsterdam, 1942, pp. 117, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 25.
Ephestia kühniella, which produces eggs all the year round, was used as a test insect in laboratory tests of winter sprays carried out in Amsterdam. Various techniques of testing the sprays are described. It was found that the ammonium compounds of dinitrocresol are more toxic than its potash, sodium or lithium salts. Medium concentrations checked the development and weak solutions had a stimulating effect. Oil emulsions proved very effective against young *Ephestia* eggs, whilst dinitrocresols gave better results with older eggs.

1170. JOHANSSON, E. 631.458
Jordtrötthet i plantskolor och fruktträdgårdar. Formalin- och karbolineumbehandling ger gott resultat. **(Formalin and carbolineum treatment for exhausted soil in nurseries and orchards.)**
Fruktodlaren, 1944, Nr. 1, pp. 19-20, being *Meddel. Statens Trädgårdsförs.* **18**.
Having previously shown that soil sickness in nurseries and orchards can be successfully treated with disinfectants, the present trial, conducted at Alnarp, demonstrated that the treatment is a commercial proposition if fruit tree

carbolineum is substituted for the originally tested, more expensive chemicals. The subsequent increased weight of nursery trees was only little less marked after the application of carbolineum than after that of formalin.

1171. HADORN, C. 634.8-2.952.21
Weitere vergleichende Versuche im Jahre 1943 über Kupfersparmöglichkeiten im Weinbau. **(Further comparative tests of copper-saving sprays in viticulture conducted in 1943.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 100-28.

The paper summarizes the 1943 results of investigations carried out at Wädenswil to explore the possibility of saving copper in the vineyard. During the period covered by the report 39 different sprays and spray mixtures were compared, but it was not possible to issue new recommendations to growers. It is claimed, however, that the results suggested further elaboration of some interesting preparations or combinations. Again, only red Kupfer-Sandoz proved a reliable copper-saving spray of real practical value. The recommendations include the following points: (1) If possible, continue to treat the same plot with the same spray; (2) do not apply Kupfer-Sandoz on a lime-containing spray cover, i.e. after 2-3 applications of bordeaux; (3) apply the first treatment after flowering particularly thoroughly and aim at the shoots bearing the inflorescences. The results of the test are recorded in great detail.

1172. ROSS, W. A. 632.951
A powerful new insecticide.
Canad. Hort., 1944, **67**: 123-4.

An account is given of some results obtained at Vineland Experiment Station, Ontario, and elsewhere with the insecticide DDT, dichloro-diphenyl-trichloroethane [or Gesarol]. DDT acts as a contact and stomach poison, is very effective against certain insects, can be used with safety on most plants and is compatible with the common fungicides. It is more effective than lead arsenate against codling moth larvae, but is less toxic against mature larvae than dinitro-cresol-oil and of little value against red spider. It is practically specific against certain leaf feeding caterpillars at the low concentration of ½ lb. per 100 gal. The effect on bees may prove to be a limiting factor in its use. [In Switzerland it is found that spray cover is not harmful to honey bees except by direct contact, thus spraying should not be carried out at blossom time, see *Schweiz. Z. Obst-u. Weinb.*, 1942, 51: 245-51; *H.A.*, 14: 624.—ED.] Further features of DDT are the lengthy persistence of its toxic action, its effects as a deterrent and the complete protection it affords plants against certain insects. The U.S.A. Department of Entomology is this year conducting trials against codling moth, oriental fruit moth, grape-berry moth, rose chafer, currant fruit fly, western white grub, apple maggot, strawberry weevil and others.

1173. AHLBERG, O. 632.951.23
Arsenikföreningars användning inom växtskyddet. **(The application of arsenic compounds in plant protection.)**
Växtskyddsnotiser, 1944, Nr. 2, pp. 17-9.

The new Swedish Government regulation concerning the application of arsenic compounds in plant protection is discussed.

1174. EBELING, W., AND OTHERS. 632.951
Addition of extractives of rotenone-bearing plants to spray oils.
Hilgardia, 1944, **15**: 675-701.

The ground root of rotenone-bearing plants and the finely-divided ether extractives of the ground root were dissolved directly in spray oil by stirring for a 20-minute period at 25° C. The ether extractives were also added to the oil by means of mutual solvents. These consisted of (1) solubilizers, which resulted in solutions of derris extractives in oil which were largely in a colloidal state, and (2) oleotropic solvents, which were relatively inefficient, but resulted in true solutions of the extractives in the oil. The latter solutions proved to be more effective than the former against the red scale of citrus, *Aonidiella aurantii*. The rotenone and rotenone-free extractives derived from derris root appeared to be about equally effective when used in oil against the red scale, and to have a synergistic effect when used together. Among the oil-toxicants, the less volatile solutions had a more prolonged residual effect than the volatile oils such as kerosene, but if the latter were sufficiently effective, they might result in a better degree of red scale control even as long as 9 months after treatment than the oils which were less volatile but were also less toxic.

W.E.

1175. KALMUS, H. 632.6/7: 632.95
Action of inert dusts on insects.
Nature, 1944, **153**: 714.

Supports the opinion of Dr. V. B. Wigglesworth (*H.A.*, 14: 622) that the desiccating action of inert dusts on insects is dependent on abrasion of the waxy substances which form a thin layer on the cuticle. Dusted insects previously rendered inert survived until movement was permitted, whereupon they would succumb in a few minutes. Other supporting data are also provided.

1176. CURTIS, L. C. 632.951
The influence of guttation fluid on pesticides.
Phytopathology, 1944, **34**: 196-205, bibl. 18.

This investigation carried out at the Connecticut Agricultural Experiment Station, New Haven, Conn., shows how guttation fluid increases the solubility of pesticides and its effects in various directions.

1177. COMAR, C. L., AND BARR, C. G. 632.951/2
Evaluation of foliage injury and water loss in connection with use of wax and oil emulsions.
Plant Physiol., 1944, **19**: 90-104, bibl. 26.

The controlled environment chamber used in these investigations at Michigan Experiment Station is described with the aid of a schematic diagram. Chlorophyll destruction was easily measured by infra-red photography by which means necrotic areas, which can scarcely be observed visually, are clearly differentiated in the photographic print. Efficiency and injury ratings were determined by the aid of the sunflower as a test plant. As a result of the investigations formulae were developed which are effective in reducing water loss from plants for short periods of time without apparent injury.

1178. YAGODKINA, V. P. 632.952
Creolin as a powerful fungicide.
C.R. Acad. Sci. U.R.S.S., 1941, **30**: 453-5.

Creolin dust was found to act as a valuable control for *Botrytis cinerea* and other fungi on castor oil and peanut plants at the time of harvesting, stacking and storing. It was also successful as a peanut seed disinfectant.

1179. NIELSEN, L. W. 632.952: 546.57
Studies with silver compounds and mixtures as fungicidal sprays.
Mem. Cornell agric. Exp. Stat. **248**, 1942, pp. 44, bibl. 28.

Potato plants and *Phytophthora infestans* were used as test materials. The silver and ferrous sulphate mixture was found to be the most adhesive of the several promising silver sprays, its adhesiveness being equal to that of 3-3-50 bordeaux. Data on its field performance are not available.

1180. HOPPERSTEAD, S. L., GOODWIN, M. W., AND RICE, P. L. 632.95
Further studies of new spraying equipment.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 13-9.

An illustrated account of spraying with the so-called Speed sprayer, with two 8-nozzle brooms, one operated from a tower and one from the ground, and finally with the vertical broom attachment sprayer.

1181. HARTZELL, A. 632.951
Further tests on plant products for insecticidal properties.
Contr. Boyce Thompson Inst., 1944, **13**: 243-52, bibl. 24.
Products of 125 species and varieties of plant were tested for insecticidal properties.

1182. CULBERTSON, R. E. 632.951: 615.779.1
Flowers that fight malaria.
Agric. Amer., 1944, **4**: 66-8.
An account of the newly established industry of pyrethrum production in Peru and Ecuador. Interest lies in the adaptation of the normal cultivation methods to local conditions.

1183. ACREE, F., Jr., JACOBSON, M., AND HALLER, H. L. 632.951
***Amorpha fruticosa* contains no rotenone.**
Science, 1944, **99**: 99-100, bibl. 9.
Amorpha fruticosa, whose stem, bark and seed give a positive Durham test and were therefore believed to contain rotenone, was re-examined at the U.S. Bureau of Entomology and Plant Quarantine. The authors showed, however, that the reaction was given by a glycoside ($C_{38}H_{40}O_{16}$) behaving similarly to rotenone and they propose the name of " amorphin " for the new compound.

1184. ULLRICH, H., AND SEEMANN, J. 632.111
Über die Verwendung von handelsüblichen Kühlschränken für Frostresistenzversuche an Pflanzen, insbesondere Frostresistenzprüfungen. **(The use of ordinary refrigerators for testing the frost resistance of plants.)**
Z. Pflzücht., 1943, **25**: 1-7, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 26.

SCHERZ, W. 634.8-2.111-1.523
Die Aussichten züchterischer Bekämpfung von Winterfrostschäden der Weinrebe. **(The prospects of controlling winter damage to vines by breeding resistant varieties.)**
Wein u. Rebe, 1943, **25**: 43-60, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. pp. 20-1.

SCHEU, G. 634.8-2.111
Die Frostschäden des Jahres 1939/40. Ein Beitrag zur Frage der Frostfestigkeit unserer Rebsorten vom Standpunkt des Rebenzüchters. **(The frost damage of the year 1939/40. The frost resistance of German vine varieties from the breeder's point of view.)**
Wein u. Rebe, 1942, **24**: 47-64, 79-64, 79-87, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 62.

RODRIAN AND BINSTADT. 634.8-2.111
Bericht über Frostschäden an Reben im Winter 1939/40 in den deutschen Weinbaugebieten. **(Report on frost damage to vines in German viticultural districts during the winter of 1939/40.)**
Wein u. Rebe, 1941, **23**: 231-77, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 33.

IMPERIAL MYCOLOGICAL INSTITUTE. 632.8
Virus names used in the Review of Applied Mycology.
Publ. (out of series) *imp. mycol. Inst.* (stencilled), 1944, pp. 44.

HILDEBRAND, E. N. 634.71-2.3
New strain of *Agrobacterium rubi* from boysenberry.
Phytopathology, 1944, **34**: 259-60.

STAPP, C. 632.314
Der Pflanzenkrebs und sein Erreger *Pseudomonas tumefaciens*. 11. Mitt. Zytologische Untersuchungen des bakteriellen Erregers. **(Crown gall and its causal organism *P. tumefaciens*. 11th commun. Cytological investigations.)**
Zbl. Bakt., 1942, *Abt.* II, **105**: 1-14, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 65.

SCHMIDT, M. 632.42: 634.11-1.521.6
Untersuchungen über die Biologie von *Venturia inaequalis* im Zusammenhang mit der Züchtung schorfwiderstandsfähiger Apfelsorten. **(The biology of *Venturia inaequalis* in relation to the breeding of scab-resistant apple varieties.)**
Forschungsdienst, 1942, *Sonderh.* **16**, pp. 498-506, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. pp. 19-20.

JAHN, E. 632.42: 634.11
Beiträge zur Perithezienentwicklung von *Venturia inaequalis* (Cooke-Aderhold) in Reinkultur. **(The development of perithecia of *Venturia inequalis* in pure culture.)**
Gartenbauwiss., 1942, **17**: 151-5, bibl. 8.

DU PLESSIS, S. J. 634.8-2.48
n'Blaarvleksiekte van Wingerd veroorsaak deur *Isariopsis Fuckelii* (Thüm.) Du P. **(Leaf spot disease of vines caused by *Isariopsis fuckelii*.)**
Ann. Univ. Stellenbosch, 1942, Vol. **20**, Reeks A, No. 1, pp. 26, bibl. 24.

EVANS, J. A. 632.6/7: 634.1/2
Fruit insect problems in 1943.
Proc. N. York St. hort. Soc. 89th annu. Meet. 1944, pp. 144-56.

HAYWARD, K. J. 632.7(824.5)
Primera lista de insectos Tucumanos perjudiciales. **(A first [annotated] list of the injurious insects of Tucuman.)**
Publ. misc. Estac. exp. agric. Tucuman **1**, 1942, pp. 110, bibl. 21.

SMITH, W. W. 632.6/7: 634.7
Bramble and bush fruit insects.
Circ. Mo. agric. Exp. Stat. **220**, 1942, pp. 4.

THOMAS, C. A. 632.765
The biology and control of wireworms. A review of the literature.
Bull. Pa agric. Exp. Stat. **392**, 1940, pp. 90, bibl. 452.

WIESMANN, R. 634.8-2.654.2
Milben- oder Kräuselkrankheit (Akarinose) der Reben. **(Leaf curl of vines caused by the mites *Phyllocoptes vitis* and *Epitrimerus vitis*.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 50-4, being *Flugschr.* **17**.

PALIATSEAS, P. 634.63-2.77
Die Olivenfliege (*Dacus oleae*) in Griechenland. **(The olive fly in Greece.)**
Anz. Schädlingskde, 1942, **18**: 111-5, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 25.

DE AZEVEDO, A. R. 632.78
A *Cydia pomonella* L. e a sua biologia em Portugal. **(Bionomics of the codling moth in Portugal.)** [English summary ½ p.]
Agron. lusit., 1941, **3**: 135-6, bibl. 8.

HATTINGH, C. C. 634.13-2.78
A study of codling moth oviposition in a mixed pear orchard.
J. ent. Soc. S. Afr., 1942, **5**: 137-46, bibl. 3.

NEL, R. I. 632.78
The validity of the bait-trap method of spray timing in codling moth control.
Ent. Mem., S. Afr. Dep. Agric., 1940, **2**: 55-76, bibl. 35.

DIMOND, A. E., AND HORSFALL, J. G. 632.952
Synergism as a tool in the conservation of fungicide.
Phytopathology, 1944, **34**: 136-9.

BREDENKAMP, J. 632.951
Zur Kenntnis der Wirkungsweise der Kontaktgifte mit besonderer Berücksichtigung der Permeabilität der Insektencuticula. **(The mode of action of contact poisons with special reference to the permeability of the insect cuticle.)**
Z. angew. Ent., 1942, **28**: 519-49, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 68-9.

BALL, R. S. 632.951: 615.779.1
Pyrethrum cultivation in Kenya.
Bull. imp. Inst., 1944, **42**: 13-24. Also printed in *Nyasaland agric. J.*, **4**: 1: 7-18, noted *H.A.*, 14: 633.

1185. IMPERIAL PARASITE SERVICE (THOMPSON, W. R.) 632.96
A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 1. Parasites of the Arachnida and Coleoptera, 1943, pp. 151. ***Part 2. Parasites of the Dermaptera and Diptera, 1943,*** pp. 99. ***Part 3. Parasites of the Hemiptera, 1944,*** pp. 149. ***Part 4. Parasites of the Hymenoptera, Isopoda and Isoptera, 1944,*** pp. 130, obtainable from Imperial Agricultural Bureaux, Central Sales Branch, Penglais, Aberystwyth, Wales, 10s. each.

VEGETABLES, FIBRES AND OTHER PLANTS.

1186. GILES, W. F. 635.1/7
Our vegetables: whence they came.
J. roy. hort. Soc., 1944, **69**: 167-74, summary in *Nature* 1944, **154** : 330-1.
A full summary will appear in the next issue of *Horticultural Abstracts*.

1187. FROLIK, E. F., AND LEWIS, R. D. 631.531
Seed certification in the United States and Canada.
J. Amer. Soc. Agron., 1944, **36**: 183-93, bibl. 10.
The extent and importance of seed certification in Canada and U.S.A. and its value to the agronomist are discussed, and the mutual aid which the certifying agency, the agricultural research stations and those who grow seed commercially can give one another is stressed.

1188. DEPARTMENT OF AGRICULTURE, UNION OF S. AFRICA. 631.531: 633/635
Special seed-production number.*
Fmg S. Afr., 1944, **19**: 210-80.

PONT, J. W. 631.531: 635.1/7
General vegetable seed situation, pp. 257-8.
In the period between the two wars nearly all the vegetable seed used in S. Africa was imported and in 1939 some 600 to 800 tons of seed were thus made available. A table is given of the amount of seed required for the different vegetables in January, 1944, and of the amount which may reasonably be expected to be locally produced or is on hand. Only some 16 tons require to be imported, covering part of the supplies needed for celery, cucumber, kohlrabi, lettuce, parsley, radish and watermelon. The figures suggest that there are considerable surpluses, of 7 tons in each case or more, of the following seed: beet, carrot, cauliflower, onion, peas and pumpkins.

VAN ELDEN, H. 631.531: 635.1/7
A vegetable seed industry for the Union, pp. 259-62, 265.
An account is given of the ways by which the Division of Horticulture has fostered and helped the new seed industry in S. Africa by certification of seed, and liaison generally between the seed trade and the growers. A three-page list is given of standard vegetable varieties suitable for S. African conditions and of their characters. Standards are being fixed for different varieties, and by insistence on selection up to these standards and on upgrading of desirable strains improvement should soon be achieved. A note of warning is given that though the seed of many vegetables can be raised in S. Africa, post-war development of seed production will depend on cost of production. Seed production will have to be limited to those crops which can be grown to perfection at the lowest possible cost by concentrating on and standardizing particular varieties and establishing a uniform standard of quality.

DIVISION OF HORTICULTURE. 635.1/7: 631.531
Sowing chart for vegetable-seed production, p. 266.
A sowing chart is given showing, among other things, the distance at which to sow, plants per acre, yield in relation to seed and yield per acre.

HOFMEHR, J. D. J., AND VAN ELDEN, H. 631.531: 635.13
The production of carrot seed, pp. 266, 267, 278.
Complaints of bolting in carrots have led to an examination of the plants raised from seed received from 8 S. African and 4 foreign sources. Chantenay exhibits the most pronounced tendency to bolt of the 5 varieties tested. Considerable variation occurs in the size and form of carrots of both imported and locally grown Chantenay, which indicates the necessity for stricter selection. The other data show that with careful selection locally produced seed can be just as good as imported. The tendency not to transplant carrots for seed production, but to market the best carrots and leave the rest to produce seed is deplored.

OOSTHUIZEN, M. J., AND SELLSCHOP, J. P. F. 631.531.16: 632.6/7
Storage of seed and control of insects in stored seed, pp. 271-3.
The optimum conditions for seed storage are those which reduce the vital activity of the seed to a minimum. These can be achieved by thoroughly drying the seed before storing and keeping it in a cool dry place after cleaning well to remove all impurities. To facilitate the drying out of seed and to allow of free circulation of air it is recommended that the bags of seed should be packed in long narrow stacks on poles well away from floors and walls. Seed can be safeguarded against insect attack by (1) producing in areas with climatic conditions unfavourable for seed-infesting insects, (2) the use of fumigants, dusts and heat treatment, (3) good store management and reducing sources of infestation. Notes are given on how to achieve these conditions in S. Africa.

* Abstracts are given only of articles of horticultural interest.

VAN DER PLANK, J. E. 631.531.17
The disinfection and protection of seed, pp. 274-8.
The following disinfectant groups are considered: Copper group, formalin, organic mercury compounds and such new non-metallic compounds as chloranil. Treatment of the seed of potato, groundnut, peas and tobacco and other, non-horticultural, crops is discussed, special attention being given to the treatment of potatoes with mercuric chloride (corrosive sublimate) against scab and *Rhizoctonia*.

SELLSCHOP, J. P. F. 631.531.5
The function of the seed-testing station, pp. 279-80.
The main functions of the Seed Testing Station at Potchefstroom are the making of routine purity analyses and germination tests, conducting investigational work in connexion with seeds, and administrating the law of 1917 so far as seeds are concerned and such other relevant regulations as have been enacted at different times. Testing of seed is done mainly according to the rules of the International Seed Testing Association, the Association of Official Seed Analysts of North America and the U.S. Department of Agriculture. Notes are given on methods of sampling and size of sample required.

HENNING, L. J. 631.531: 635.54
Chicory seed, p. 218.
Formerly, chicory seed for planting up the chief South African area under chicory, namely, the Alexandria District of Cape Province, all came from the United States. The present position is that the seed produced since 1939 in S. Africa is very mixed and steps are therefore being taken at the Glen College of Agriculture to develop superior strains.

KOCH, P. 631.531: 633.71
Tobacco seed, pp. 223-4.
The following advice is given to growers wishing to keep seed from their own crop. (1) Select about a dozen or more of the best plants, judging them on size of leaf, thickness of midrib, trueness to variety, type of plant, freeness from disease, yield, etc. (2) Cover the terminal bud with a 12 lb. brown paper bag and fasten the lower end with string. (3) Before covering up the terminal bud trim off all side branches, leaving the bud with its 3 terminal branches only. Remove all flowers already opened or capsules already formed. (4) Inspect flower heads thus bagged weekly to obviate damage by caterpillars. (5) As soon as the capsules inside the bags have turned brown, cut off the whole seed head including the paper bag and hang up in inverted position to dry. When the seed is quite dry, the capsules are broken and the seed is collected. Alternatively, seed can be obtained from one of four Government institutes according to the type required. Breeding and testing of new varieties is now undertaken at the Central Tobacco Research Station near Rustenburg and at Nelspruit, while multiplication of approved seed for general distribution is done at the Hartebeestpoort Experiment Station. Since tobacco is subject to many diseases the necessity for sterilizing seed before sowing is stressed.

LAUBSCHER, F. X., AND OTHERS. 631.531: 635.65
Field beans, pp. 246-8, 254.
The confusion existing in the nomenclature of field beans is deplored. While nearly all the S. Africa-grown field beans, except for a few Lima types and Tepary, belong to the *Phaseolus vulgaris* group, one widely grown bean, the Bomba, belongs to *P. multiflorus*. It is suggested that high veld farmers might in certain cases well substitute the Robust variety of field bean for it. Notes are given on the popularity of certain sugar beans. It is suggested that, until such time as the various kinds of sugar bean and white haricots have been properly tested and classified, growers would do well to keep their own seed requirements or merely to buy such seed as can be identified beyond all doubt.

SAUNDERS, A. R. 631.531: 635.655
Soya beans, cow peas and other legumes, pp. 251-4.
Notes are given on the production of seed of these most important leguminous hay crops.

DU PREEZ, D. 631.531.16: 634.1/2-1.541.11
Stratification of seed for the production of seedling stocks, pp. 255, 256, 258.
Observations made in stratification trials carried out at Stellenbosch in the years 1939 to 1942 led to the making of certain recommendations for S. African conditions with regard to some of the material used for fruit tree rootstocks. *Kakamas peaches*. The seed should dry out in the packing shed, after which it can be stored in boxes prior to stratification. The best treatment of those tested consisted in leaving it outside for 84 days and afterwards cold storing at 40° F. for 45 days, i.e. the total stratification period in moist peat was 129 days. Seeds should be kept moist but not too wet during stratification. *Wild pear*. The seed should be stratified outside in moist peat for a certain time and afterwards at 40° F., a total stratification period of approximately 116 days proving the best conditions. It is essential to separate the seed from the pulp as soon as possible. The viability of seed from different trees should be carefully tested as it varies considerably. *Wild mazzard cherry*. One test showed clearly the necessity for precooling the seed at 40° F.

1189. HAWKINS, F. 635.1/7: 631.531
Production of seeds of temperate vegetables in East Africa. War-time efforts and suggestions for the future.
E. Afr. agric. J., 1944, **9**: 196-202, bibl. 9.
A Seed Station for the investigation of temperate vegetable seed production in East Africa has been established at Turi, at an altitude of 7,700 feet. Although the work has only recently started it is thought that a record of the experience so far gained should not be withheld. Vegetables most suited to tropical conditions are those known in England as "early" varieties, for they can complete their vegetative stage and appear to be at no disadvantage in proceeding to the flowering stage. If English winter-hardy kinds and main crop varieties have to be grown in the tropics, as at present when seed growers must take what is sent them, they should be given a high altitude. Their day-length requirements cannot be considered. Some doubt is expressed as to the attitude of colonial public opinion in regard to local vegetable seed raising after the war. Probably, as formerly, people will prefer to get what seeds they want from Europe and local selections will be ignored. Such a policy will never produce strains of any value for the tropics. Although numerous tropical and sub-tropical crops have been adapted to temperate climates the converse has seldom occurred. The so-called degeneracy of temperate vegetables in the tropics is merely a reversion to more primitive types, in no sense degenerate and is due to lack of care in selection. Temperature and water are far more important than length of day, and growers wishing to produce seeds of many kinds of vegetables must use many altitudes. The soil should be analysed for phosphates, since seed production requires nearly double the normal quantity. Roots which have to be lifted for selection and stored for replanting and flowering

the following year are thereby considerably checked. Replanting should be done under irrigation. The method of digging a furrow alongside each row and examining the full length of only one side of the roots, leaving them but little disturbed, has been successful. It requires more work and closer supervision of native labour than lifting and replanting. Grading seed is important and will be undertaken for growers by the seed station since proper machinery is required. Hand sieving is of little use. Seed can be stored for at least a year in a dry area if packed in double sacks and raised on battens for ventilation. A chemical seed dressing is advised or, failing that, a dusting with pyrethrum powder. A brief list of varieties that have grown well and produced seed is given, together with the altitudes at which they have done best. Vegetables which have so far flourished vegetatively and also produced seed are beans, beets, cabbages, carrots, cauliflowers, kales, leeks, lettuces, onions, radishes, tomatoes and turnips. In the bibliography the first two references to *Horticultural Abstracts* should read *Hort. Abstr.* 11: 357 (for 9: 357) and probably 11:93 (for 9: 330).

1190. BARTON, L. V. 631.531
Some seeds showing special dormancy.
Contr. Boyce Thompson Inst., 1944, **13**: 259-71, bibl. 6.

Seeds of certain plants native of the colder parts of N. America, e.g. *Trillium grandiflorum, Sanguinaria canadensis* and others possess epicotyl dormancy and require exposure to temperatures of 5° C. to 10° C. after the root has been formed before shoot growth can start. Some of the varieties also showed dormancy or partial dormancy of the root which could be broken by low-temperature pretreatment of the seeds. Thus *T. grandiflorum, T. erectum* and *Caulophyllum thalictroides* require two separate cold periods, one before the appearance of the root and the other after germination of the root has taken place.

1191. NELLY, J. D. 631.531.17: 631.588.1
Electrodialysis of seeds.
Plant Physiol., 1944, **19**: 19-32, bibl. 14.

The effect of electrolysis, or electrodialysis as it is here called, on certain pea and bean seeds was studied at Chicago University. The results with treated seeds were a marked decrease in germination percentage, a subsequent lowering of CO_2 production, a more rapid loss of Ca, Mg and K and a removal of cations which was more than equivalent to the removed anions. The ash of Laxton's Progress pea seeds electrodialysed for 2 hours or more at 150 volts contained no sulphate ion. Alaska peas treated for 2 hours at 80 volts showed a very low ascorbic acid content in the early stages of germination, but the deficiency was made good by the end of the fourth day.

1192. ABBISS, H. W. 635.1/7 +634.711
Growers notes—trial extracts—1942-3.
Publ. (out of series) *Cornwall C.C.*, 1943, pp. 22.

An instructive account of demonstrations and tests of vegetables carried out at the Cornish experimental stations at Gulval and Ellbridge in the past few years. They included tests of varieties and methods of cultivation, etc., of outdoor tomatoes, lettuce, cucumbers, early potatoes, winter spinach, brussels sprouts, spring and summer cabbage, onions (autumn sown, pickling and spring), peas, broad beans and dwarf beans. Trials are also reported of lettuce and carrots under Dutch lights. Soya beans were not successful. There were also raspberry variety trials. Meteorological records are given.

1193. SECRETT, F. A. 635.1/7: 631.3
Mechanization in market gardening.*
Gdnrs' Chron., 1944, **115**: 160-1, 178-9, 188, 208-9, 214, 226, 241, 246, and abridged version *Agriculture*, 1944, **51**: 173-8.

In a paper read at the Institute of British Agricultural Engineers, London, on 28 March, 1944, Mr. Secrett dealt in detail with the problem of mechanization for the small grower. He is convinced that a high degree of mechanization is necessary if the holding is to be profitably worked. Co-operative societies should be started to enable members to hire such labour-saving tools as it may not be economic to purchase, and to assist in the marketing of produce. It is shown that far from reducing labour the introduction of mechanical devices, by leading to increased output and increased profits, has always acted in the reverse direction. The need for research in the production of new horticultural implements is stressed. At present design is often faulty. Research is needed on row crop tools, small tractors, irrigation plants, washing machines, drills and sprayers in order to provide a set of standard tools in place of the present heterogeneous collection of implements, many both an anxiety and an annoyance. Vegetable growers, unlike fruit and glasshouse growers, take little interest in research. Turning to detail Mr. Secrett said that a new and improved light tracklaying tractor was needed, which could be used in place of the heavier wheel tractor which had to be supplemented by later horse-hoeing. For medium horticultural farms a coupled plough and medium tractor, operated by hydraulic lifting gear has proved very useful on account of ease of manoeuvring. A disc harrow is indispensable, tooth harrows or rolls must be used with light horses for the final cultivation. The pitch pole harrow is useful for cleaning foul land. Row crop tools especially for close rows need considerable improvement, a chief requirement being for the driver to be able both to watch the progress of the tool and steer his machine without wearisome contortion of the body. A satisfactory market garden seed drill has yet to be devised. The requirements are specified. Rolls need to be improved. A large wooden roll is of high value in preparing land for small seeds and for rolling after drilling. A light roll of small diameter will often compact the ground more than a heavier roll of large size. Many growers still do not understand the proper use of rolls. Planters are already more efficient than hand labour, if manipulated by a skilled tractor driver, and the plants get a better start. It is even possible to plant leeks as closely as 1 foot×8 inches. There is need for a similar machine for small plants such as lettuces. A disadvantage is that the soil must be in a friable condition. A suitable manure distributor is a machine badly needed, the results of uneven distribution can be seen all over the country. There is a definite need for a light mobile sprayer, capable of working over crops and having an adjustment of nozzles and output to make the operation economically possible. The vaporizing type of machine has possibilities of development. The benefits to be derived from an irrigation system, the methods and plants to be employed are discussed at length. The author is convinced of its value in spite of the dripping climate of these islands. The heating of greenhouses receives brief mention; soil heating has not yet been popularized. Further subjects briefly mentioned are farm roads and layout, packing sheds, various produce preservation processes, the need of advisory work within the industry, which should be correlated with the Ministry of Agriculture and act as a connected unit for the whole country.

1194. MACGILLIVRAY, J. H., AND OTHERS.
613.2: 635.1/7 +664.84
Food values on a pound, acre and man hour basis for California fresh vegetables and Food values on a pound, acre and man hour basis for California processed vegetables.
Compilations Calif. agric. Exp. Stat., 1943, pp. 23, bibl. 41, and pp. 15, bibl. 16 respectively.

The primary object in producing vegetables at the present day is the greatest production of essential human food with

* Paper and discussion will also be printed in November issue of *Proc. Inst. Brit. agric. Engn.*, 58 Gordon Square, London, W.C.1, 2s. 6d. post free.

e facilities available. In grading in tabular form fresh lifornian vegetables and Californian vegetables processed particular ways the author offers a useful comparison tween them. He grades them according to the sum of ranks under each of the following headings: Nutrients r pound as purchased (dehydrated peas being 1st, with sh mustard greens 11th and fresh winter squash 30th), trients per acre with average yields (fresh mustard greens ing 1st, dehydrated peas 41st and fresh winter squash 11th), d nutrients per man-hour (fresh winter squash being 1st, hydrated peas 10th and fresh mustard greens 2nd). nder the nutrient units per pound the following are nsidered: energy in calories, protein, calcium, iron, amin A, ascorbic acid, thiamin, riboflavin and niacin.

95. MacGillivray, J. H. 635.1/7: 631.16
Labor and material requirements of Californian vegetables.
Compilation Calif. agric. Exp. Stat., 1943, pp. 15.
is report which may be considered as a supplement to those ted in the previous abstract shows the labour requirements d materials essential for producing the necessary acreages vegetables in California in the period 1937-41. Through e data here provided the different crops can be compared cording to their needs for various nutrient and other aterials, some of which have become limited as the result the war.

96. MacGillivray, J. H., and others. 635.1/7
An evaluation of California vegetables.
Compilation (Stencil) *Calif. agric. Exp. Stat.*, 1943, pp. 5, bibl. 3.
e nutrient-value calculations for 31 fresh and 16 processed lifornia vegetables were based on the following data:) calories, protein, calcium, iron and vitamins, (2) edible rcentage of the vegetable, (3) average yield per acre in 37-41, (4) number of man-hours required to produce these erage yields. Based on the data obtained from these lculations the vegetables were classed in 4 groups according their nutrient content per pound, acre and man-hour. It estimated that a shift in acreage of 10-15% from crops in e group to another would be involved if the author's sults were to be generally adopted in California.

97. Jones, L. T. 635.1/7: 631.85/87
Some organic manures used with vegetables.
J. Dep. Agric. W. Aust., 1943, **20**: 281-5.
e Department of Agriculture, W. Australia, in co-opera-n with commercial growers has begun investigations on e effects of certain organic manures on vegetable crops. *ouring works waste.* Sediment remaining in the vats ien the wool is washed with potash soaps. The samples amined seemed to consist of sheep manure and wool, but mposition is liable to vary. Analysis on a normal oisture content basis gave N 2·22%, P_2O_5 0·53%, K_2O 04%. Cauliflowers grown in this manure showed (it s thought) potash deficiency, but late applications of tash were ineffective. Turnips showed too vigorous top velopment. Added superphosphate would produce a tter balanced manure. *Barley combings.* A by-product the malting industry consisting of dried sprouts of malted rley grains. Analysis N 4·27%, P_2O_5 1·41%, K_2O 12%, moisture 14·12%. The combings were able to ieve potash deficiency symptoms in cabbage. *Blood and ne manure.* Analysis N 5·11%, P_2O_5 15·69%, K_2O 25%. The success of this manure is attributed in part the fact that it contains, besides NPK, a supply of minor ments necessary to growth on this soil. The same results re obtained when to an ordinary NPK fertilizer were ded Mg as Epsom salts, Cu as bluestone, Mn as manganese lphate and Zn as zinc sulphate. The conclusion is reached at so long as the humus content of the soil is kept at a tisfactory level there is no reason why artificial fertilizers ould not produce vegetable crops as satisfactorily or better an organic manures.

1198. Truninger, E. 631.811.6
Zur Frage der Magnesiadüngung. **(Magnesium as a fertilizer.)**
Landw. Jb. Schweiz, 1944, **58**: 131-48, bibl. 2.
The author after touching on the magnesium content of the soil deals with Mg deficiency symptoms in mustard, cress, oats, maize and barley. He then notes the effects of withholding or giving various amounts of magnesium sulphate, magnesium carbonate and dolomite to oats, maize, spinach and flax in pots. Further he gives comparative results of applying Patent kali salts containing about 10% MgO and 30% potassium salts to potatoes, and finally he describes a trial by Salzmann in which these two last fertilizers were applied to flax and poppies in the field. The difference in effect of the different forms of magnesia-containing substances seemed to be small. In one case the starch content was greater in potatoes manured with Patent kali than in those manured with 30% potassium salts. In other cases there was little if any noticeable difference.

1199. King, F. C. 631.876.9
Sawdust in the garden.
Gdnrs' Chron., 1944, **116**: 18-9.
The author describes various uses of heavy dressings of sawdust in the vegetable and fruit garden. It has proved particularly effective in keeping down annual weeds, but its use requires experience and he considers it to be among the most difficult of materials for a novice to compost.

1200. Faulkner, R. P. 635.1/7: 631.415.1
Vegetables and soil acidity.
Gdnrs' Chron., 1944, **115**: 229.
Tomatoes and lettuces were grown at University College, Nottingham, on two adjoining, but distinct soil types, namely heavy, but fertile and slightly alkaline, clay, and a strongly acid sand. Though growth of tomatoes was equally good on both types, nearly all those infected with virus in 1942 and all in 1943, irrespective of variety, were on the sand. The crop in 1944 was changed to early brassicas and May Queen lettuce, both sand and clay having been given a heavy dressing of lime. The brassicas are growing strongly in both plots but the lettuce on sand has failed badly. Presumably the lime has not yet had time to enter into solution on a sandy soil. Sewage sludge is useful for quickly bringing ground into cultivation for it contains lime supplied at some stage of the purification process, and this by the time it reaches the land is already decomposed and the calcium is combined with the acidic elements. This is probably the reason why green vegetables do so well on sewage.

1201. Rochford, B. 631.544
Essential food crops under glass.
Agriculture, 1944, **51**: 123-6.
The switch over from flower growing to the growing of essential food crops in Britain's greenhouses is described. Tomato production under glass has more than doubled the pre-war figure—about 60,000 tons—and is about equal to pre-war supplies of fresh tomatoes from all sources during the months April to October.

1202. Koch, L. W. 635.1/7: 632.3/4
Control of vegetable diseases in Ontario seedbeds and cold-frames.
Canad. Hort., 1944, **67**: 51-3.
The article, which is contributed by the Department of Agriculture, Ottawa, deals with the precautions against disease in the early stages of vegetables in Canada and provides a useful table of seed treatments for all the common vegetables.

1203. Society of Chemical Industry. 631.462
Soil sterilization.
Chem. Industry, 1944, No. 26, pp. 237-9.
Lawrence, W. J. C.
Soil sterilization.
Nature, 1944, **153**: 736-8.

A joint meeting on soil sterilization was held in London in April, 1944, between the Food Group (Microbiological Panel) and the Agriculture Group of the Society of Chemical Industry and the Association of Applied Biologists. The following 5 papers were read and discussed:

(1) W. F. Bewley, speaking on **Some problems in soil sterilization,** gave a general survey of the subject and stressed the merits of steam sterilization as a remedy for soil sickness as compared with chemical sterilization and soil baking. The luxurious growth of plants in steam-sterilized soil produced by their wealth of available nitrogen should be controlled by restricting root growth in pots or any other container. Steam sterilization would constitute a most effective measure for increasing crop production, if the boiler price and the running cost could be reduced to such an extent that soil in the open could be treated. In America, steam *and* formaldehyde vapour have been used at the same time.

(2) W. J. C. Lawrence in his paper on **Soil sterilization and seedling growth** reported on the investigations carried out at the John Innes Horticultural Institution. Until recently steam sterilization had proved impracticable in mixed nurseries owing to the subsequent check to the growth of certain seedlings. The retardation was found to be due to the presence of an excess of ammonia to which many seedlings are more susceptible than tomatoes and cucumbers, the test plants used in the original experiments on soil sterilization at Woburn and Rothamsted. The checking effect could be eliminated by the addition of superphosphate which temporarily fixes the excess ammonia, possibly as calcium ammonium phosphate. An improved technique of high-pressure steam sterilization has also been evolved.

(3) A. H. Dodd's paper on **Considerations in chemical soil sterilization** dealt chiefly with the higher-boiling phenols, small quantities of which in the soil could be determined by the colorimetric method. The metabolism of phenols by bacteria was shown to be rapid and asymptotic after 2 or 3 days. For reasons given in detail and connected with its exceptional capacity for being adsorbed it was essential to administer the sterilizing agent in emulsion form, the usual concentration, which did not inhibit bacterial metabolism, being a 1% emulsion. It is thought possible that the synthesis of plant hormones (possibly the condensation of the phenols with amino bodies to form indoxyl compounds), apart from the increase in ammonia production, contributes to the initial stimulus to plant growth seen to occur after treatment.

(4) In their paper **A new technique for the study of soil sterilization,** H. Lees and J. H. Quastel described an ingenious apparatus, which preserves the soil intact during the whole course of the experiment. The method consists in perfusing a column of soil with oxygenated fluid by a circulatory technique, whereby soil solution was continuously aerated and made to percolate through the soil for an indefinite period. Thus the soil was treated, as the authors remark, as though it were a mammalian organ through which oxygenated fluid was made to circulate continuously. Although the technique has been designed to investigate all soil metabolic changes involved in the study of soil sterilization and the effects of poison upon them, the authors have, so far, limited their research to the process of soil nitrification.

(5) **The effect of chlorate administration on soil nitrification** was studied by H. Lees and J. H. Quastel by means of the technique developed by them. It was shown that the chemical (e.g. M/2000) markedly reduces the rate of nitrate formation from perfusing ammonium sulphate solutions, while nitrite is produced in abundance. Even at so low a concentration as $M \times 10^{-5}$ potassium chlorate was found markedly to inhibit the oxidation of sodium nitrate in the soil. This selective poisoning is regarded as the first satisfactory proof that nitrification in the soil proceeds in two consecutive stages. Further, the bacteriostatic effect of chlorate on the nitrite-oxidizing organisms and the protective action of nitrate are discussed.

The session is reported briefly in *Nature*.

1204. van der Plank, J. E. 633.491-1.532.2
Production of seed potatoes in a hot dry climate.
Nature, 1944, **153**: 589-90, bibl. 4.

Very high temperatures and low humidities are as inimical to the aphids that transmit potato virus disease as are low and high relative humidities. As a result of this discovery large quantities of seed potatoes are being produced near Kimberley, South Africa, the quality being superior to any of the seed customarily imported before the war. Production has to be limited in hot countries to varieties in which the symptoms of disease are not masked by heat. 'In South Africa Up to Date is the most popular of these. The Department of Agriculture is, however, experimenting with Katahdin.

1205. Helson, G. A. H., and Norris, D. O. 633.491-2.8
Transmission of potato virus diseases. 3. Susceptibility of cruciferae to potato leaf roll virus.
J. Coun. sci. industr. Res. Aust., 1943, **16**: 261-2.

Attempts to transmit potato leaf roll virus to various cruciferous plants and to the peach were unsuccessful.

1206. The Earl De La Warr. 633.52
Flax growing in war.
Agriculture, 1944, **51**: 158-62.

This paper read to the Royal Society of Arts on 24 May, 1944, gives a vivid description by the Director, Home Flax Production, of the initial difficulties arising from an increase in flax production in Great Britain from a few hundred to over 60,000 acres in the space of three years. By 1942 the tide had turned thanks to the experience gained at Sandringham, where flax had continued to be grown between the two wars, and to the experimental work done at the Norfolk Research Station before this war.

1207. Hayward, H. E., and Spurr, W. B. 633.52-1.415
The tolerance of flax to saline conditions: effect of sodium chloride, calcium chloride and sodium sulfate.
J. Amer. Soc. Agron., 1944, **36**: 287-300, bibl. 11.

At the U.S. Salinity Laboratory, Riverside, California, flax in laboratory and field culture showed itself moderately tolerant to saline conditions. The effect of high concentrations was shown in a reduction of height and diameter of stems correlated with marked changes in the differentiation of the stem tissues. Substrates of high osmotic concentrations delayed anthesis of the flower and setting of the bolls from 5 to 18 days and reduced yield by from 25 to 62%.

1208. Painter, E. P., Nesbitt, L. L., and Stoa, T. E. 633.52: 581.192
The influence of seasonal conditions on oil formation and changes in the iodine number during growth of flaxseed.
J. Amer. Soc. Agron., 1944, **36**: 204-13, bibl. 11.

The iodine number of linseed oil and the oil content of the seed appear to be influenced by (*a*) variety, and (*b*) weather conditions, but it also seems to be probable that unrecognized environmental conditions contribute to the character of the oil. The production of high iodine number linseed oil seems to depend upon the duration of the period of increase. The initial rate of increase of the iodine number is rapid when the flax is grown under unfavourable growing conditions, but the increase is inhibited at an early stage, whereas oil can continue to be deposited in the seed under

onditions which will inhibit increase in the iodine number. n very unfavourable seasons showing a combination of rought and high temperature, oil formation may be nhibited.

209. Grečuhin, E. I., and Belovickaja, N. A. 633.522

Monoecious hemp. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1940, **27**: 43-7.

Among both male and female hemp plants a wide range of ifferences was observed; there were male plants possessing emale characteristics, and female plants male characteristics. This knowledge enabled the authors to breed plants monoeious in character, and resembling either male or female lants in regard to other characters. All the plants could roduce seed or be ready for harvesting simultaneously, nd the fibre obtained from a crop of such plants was less ariable in quality than that usually produced.

210. Alexander, F. A. 633.524.1

Sunnhemp [*Crotalaria juncea*] **fibre—the new industry.**

Vuka, 1944, **1**: 9: 37 and 41.

A Rhodesian grower gives his experience in cutting, retting nd drying, decorticating, baling and transporting the unn hemp crop. He estimates that 1 acre will produce tons of dressed straw and 1 ton of straw will produce 50 lb. of line fibre.

211. Das, N. 633.524.1

Indian sunn-hemp.

Ind. Fmg, 1943, **4**: 505-7.

Cultivation, processing and local variations of sunn hemp n India are briefly described. The export trade in this ommodity, though amounting to 41,000 tons in 1938/9, vas hampered by irregular quality and unsatisfactory aling. The position has now improved following the nforcement of certain Government rules.

212. Stout, M., and Tolman, B. 577.15.04: 633.63

Field and greenhouse tests with synthetic growth-regulating substances applied to sugar beet seeds and plants.

J. Amer. Soc. Agron., 1944, **36**: 141-6, bibl. 9.

No significant result was obtained with naphthaleneacetic cid, naphthaleneacetamide, indoleacetic acid, indolebutyric acid, levulinic acid, Rootone, and Graino-special S.B. when these were applied as dusts to sugar beet seed efore planting or as sprays in various concentrations to the oliage of sugar beet plants in field and greenhouse in Utah, U.S.A.

213. Bennett, C. W. 632.8: 632.53: 633.63

Latent virus of dodder and its effect on sugar beet and other plants.

Phytopathology, 1944, **34**: 77-91.

A new virus has been discovered in 3 dodders (*Cuscuta alifornica, C. subinclusa* and *C. campestris*) at the Riverside Citrus Experiment Station, which produces mottling or ecrosis on various economic and other plants. These lodders, *Brassica incana* and certain *Nicotiana* species are ymptomless carriers. No insect vector is known. With he introduction of an efficient vector the virus might ecome dangerous to some cultivated plants, especially to antaloupe and buckwheat. The names suggested are lodder latent mosaic and *Marmor secretum* sp. nov.

214. Besser, A. A. 633.64

The maple sugar industry. [Russian.]

Priroda (Nature), 1943, No. 3, pp. 46-57.

This is an account of the maple sugar industry, which in the *U.S.S.R.* is still being evolved. Of the few species of maple ccurring in the country the following are of interest as an ctual and potential source of maple syrup: *Acer platanoides, A. campestre, A. pseudoplatanus, A. velutinum, A. laetum, A. trautvetteri, A. mandshuricum, A. mono* and *A. ukurunduense*. It is estimated by the State Forestry Research Institute that in some republics and territories of the eastern *U.S.S.R.* there are over 250,000 ha. with maples suitable for industrial production of syrup. The average quantity of sap necessary to produce 1 kg. of syrup with 67% sugar content is reckoned at 45 l. The bulk of the paper is devoted to practical hints on the technique of sap collection, syrup concentration and on costings.

1215. Murray, S. S. 633.71

Long-term outlook for Empire tobacco growers.

Crown Colon., 1944, pp. 469-70.

A survey of the wartime situation and a review of the factors which may influence the demand after the war. Figures are given for tobacco production of the principal producer countries, tobacco exports from the Colonial Empire in 1937, imports of Empire tobacco into the United Kingdom in 1937 and 1938 and gross withdrawals in the United Kingdom in 1937.

1216. Kincaid, R. R. 633.71-1.531

Effect of storage conditions on the viability of tobacco seed.

J. agric. Res., 1943, **67**: 407-10, bibl. 7.

In these experiments in Florida seed stored in the refrigerator at 5° C. over calcium chloride, Rochelle salt and ferrous sulphate retained its viability. That stored in the refrigerator over water was all dead at the end of a year. Seed stored over calcium chloride in basement, laboratory and attic all germinated well after 11 years. Seed stored in rubber-stoppered vials with an original moisture content of 5·3% or less showed a small per cent. of germination after 8 years. Seed stored in ordinary containers in the laboratory was nearly all dead at the end of 3 years.

1217. Marks, G. H. 633.71

Classification and grading of flue-cured tobacco grown in Australia.

J. Coun. sci. industr. Res. Aust., 1943, **16**: 245-57, bibl. 14.

Following a recommendation of the meeting of tobacco officers held in July, 1942, work has been undertaken to classify and grade Australian-grown flue-cured tobacco. Classification into the following 4 main types is suggested: (1) North Queensland, (2) Dumaresq Valley (Queensland-New South Wales border districts), (3) north-east Victoria, (4) Manjimup (Western Australia). Further, a system of grading according to leaf position on the stalk, leaf qualities and colour is proposed and suggestions are made for the facilitation of farm grading.

1218. Skoog, F. 633.71: 581.4

Growth and organ formation in tobacco tissue cultures.

Amer. J. Bot., 1944, **31**: 19-24, bibl. 14.

These experiments carried out at the Johns Hopkins University show that it is possible to control undifferentiated growth and organ formation in tobacco callus cultures by manipulation of external factors including nutrient composition. High light intensity, high temperature and a solid medium are favourable for maintaining cultures in an undifferentiated condition. Low light intensity, relatively low temperature and a liquid medium are favourable for organ formation. The synthesis of auxin is independent of light. The formation of stems can occur without the presence of a caulocaline, though not necessarily of substances synthesized by the tissue itself, but in contrast with calines such substances must be present in all cells. [From author's summary.]

1219. Valleau, W. D., Johnson, E. M., and Diachun, S. 633.71-2.3

Root infection of crop plants and weeds by tobacco leaf-spot bacteria.

Phytopathology, 1944, **34**: 163-74, bibl. 6.

Investigations conducted at Kentucky Agricultural Experiment Station, Lexington, proved that the causal organisms

of angular leaf spot and wildfire of tobacco, *Bacterium angulatum* and *B. tabacum*, are perpetuated in the soil from one season to another on the roots of several weeds and crop plants. Colonies of the bacteria are found on the rootlets of infected tobacco plants. Leaf-spot, it is suggested, will develop when the leaves of such plants become water-soaked and the pathogens are splashed or otherwise carried to these water-soaked areas. This explanation would account for the fact that the disease develops only following a protracted wet, cool period.

1220. DIACHUN, S., VALLEAU, W. D., AND JOHNSON, E. M. 633.71-2.3 +2.8
Invasion of water-soaked tobacco leaves by bacteria, solutions, and tobacco-mosaic virus.
Phytopathology, 1944, **34**: 250-3, bibl. 7.
Evidence is presented indicating that non-motile bacteria, virus, India ink and solutions can enter water-soaked leaves. It is tentatively suggested that water-soaking may be partly responsible for spray damage to foliage.

1221. SALMON, E. S. 633.79
Four seedlings of the Canterbury Golding.
Publ. (out of series) *S.E. agric. Coll. Wye*, 1944, pp. 8, bibl. 5, 2s. 6d.
A description which includes botanical characters, yield, aroma, preservative value, brewing trials and keeping properties, is given of 4 hop seedlings raised at Wye College in 1934 by crossing the Canterbury Golding with pollen of a seedling male hop raised from the variety Brewer's Gold. All are midseason hops. One, Southern Brewer, is susceptible to mosaic. The others, Northern Brewer, John Ford Hop and Wye Field Golding, have not shown any mosaic under similar conditions of exposure and are assumed to be potential or actual carriers of mosaic. None showed marked susceptibility to downy mildew and all are much superior to the female parent in this respect.

1222. HOLUBINSKY, I. N. 633.79: 581.142
Influence of temperature alternation on the germinable power of hop seeds (*Humulus lupulus* L.).
C.R. Acad. Sci. U.R.S.S., 1941, **31**: 85-6, bibl. 4.
Hop seeds were submitted to 7 different temperature treatments at the Zhitomir Hop Experiment Station. Germination capacity was most satisfactorily increased by submitting the seeds to soaking at a low temperature (6°-10° C.) for 5 days and then transferring to optimum conditions for actual germination, i.e. a temperature of 20°-25° C.

1223. MAGIE, R. O. 633.79-2.411
The epidemiology and control of downy mildew [*Pseudoperonospora humuli*] on hops.
Tech. Bull. N. York St. agric. Exp. Stat. **267**, 1942, pp. 45, bibl. 60.
Downy mildew of hop [in N. York State] attacks the whole plant except the roots, young tissue being particularly susceptible, stems, blossoms and cones being killed. There is no other host in N. York. It overwinters in the soil as oospores, which are produced in diseased parts of the plant during the growing season. Sporangia are produced on infected plant parts throughout the season during night periods of high humidity. Both types of spore germinate to form zoospores which infect the plant when water is present for at least 2 hours. Cool to moderate temperatures, 55-64° F., provide ideal conditions for the spread of the disease. The disease can be economically controlled even in the worst years by spraying with bordeaux 6-4-100 or yellow cuproxide 1½-100 (*a*) when the vines are about 8 ft. high, (b) two weeks later, (*c*) at the start of the bur period and (*d*) at the start of cone formation. Dusting with copper-lime 25-75 or cuprocide-sulfur 7-93 may be necessary in August. [From author's abstract.]

1224. VAN BRUNT, E. R. 633.84
The herb garden of the Brooklyn Botanic Garden.
I. Culinary herbs: their culture, traditions and use.
SVENSON, V. R.
II. Cooking with herbs.
Brooklyn bot. Gdn Record, 1943, **32**: 1-24, 25-42, bibls.
Part I contains an account of the various uses and cultivation of 50 culinary herbs.
Part II consists mainly of recipes in which herbs can be included with advantage.

1225. ELMORE, J. C. 633.842-2.76
The pepper weevil [*Anthonomus eugenii*].
Leafl. U.S. Dep. Agric. **226**, 1942, pp. 8.
The pepper weevil can be controlled by dusting at weekly intervals with cryolite containing 50% of sodium fluoaluminate. The residue is poisonous and must be removed later by washing in 2% HCl solution.

1226. ANON. 633.85-2.3/8
Sjukdomar och skadedjur på oljeväxter. 1. Raps. **(Diseases and pests of oil plants. 1. Rape.)**
Flygbl. Växtskyddsanst., Stockh. **52**, 1940, pp. 10.
War conditions having necessitated large-scale cultivation of oil plants in Sweden, a description is given of the following rape diseases and pests (with illustrations) for the benefit of growers without previous experience of this crop: *Sclerotinia sclerotiorum*, *Botrytis cinerea*, *Alternaria brassicae*, *Plasmodiophora brassicae*, *Albugo candida*, *Peronospora parasitica*, *Erysiphe communis*, *Pythium debaryanum*, mosaic and *Meligethes aeneus*, *Ceutorrhynchus assimilis*, *Psylliodes chrysocephala*, *Pieris napi*, *Eurydema oleraceum*, *Phaedon cochleariae*, *Athalia colibri*.

1227. STÄHLIN, A., AND BLIEVERNICHT, L. 633.85-1.531
Zur Beurteilung von angeschimmeltem und verschimmeltem Raps. **(The evaluation of mouldy rape seed.)**
Forschungsdienst, 1943, **16**: 220-7.
Investigations at Jena showed that rape seed affected by moulds could be regarded as sound, if it did not contain more than 1·2% free fatty acids, corresponding to a mould coating of about 5%. The photometric method was also used. Results confirmed the segregation made by appearance.

1228. ZAHAROV, B. S. 633.85-2.595.26: 612.014.44
The length of daylight and its influence on the incidence of infection by *Orobanche* in the sunflower. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 265-7.
The author describes three experiments with *Orobanche* as a parasite on sunflowers, and concludes that short hours of daylight favour the development of the parasite, causing it to appear even among varieties of sunflower which, under normal conditions of daylight, are immune to it. The greater prevalence of the parasite in southerly latitudes than in those farther north, which has already been noted, may, perhaps, be explained by these results. The phase of development of the sunflower had no noticeable connexion with the incidence and degree of infection.

1229. DEMIDENKO, T. T., AND KISILEVA, V. V. 633.85-2.595.26: 631.8
The mineral nutrition of the sunflower when healthy and when infected by *Orobanche* [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 274-7.
Sunflowers, both healthy and infected with *Orobanche*, were grown in pots and manured with NPK. Whole plants as samples were taken at intervals during growth; the content

of dry matter, N, P, K, Ca and Mg were determined in the leaves, petioles, stems, inflorescences, seed and roots. The degree of infection by the parasite, its growth, and the amounts of the mineral elements which it contained were also determined. The conclusion reached, as regards the whole plants, was that a healthy plant, during the entire growing period took in more of the elements than an infected plant; but the total quantities of such elements taken up by both an infected plant and the parasite infecting it, with the former in the flowering stage, were greater than those obtained by the healthy plant alone. The results of the detailed analyses are tabulated.

1230. Golle, V. P., and Demidenko, T. T. 633.853.55-1.8
The yield of the castor oil plant as affected by the concentration of a nutrient salt solution. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 278-80.
Castor oil plants of the variety *sanguineus* No. 141, bred by the Institute of Oil-bearing Plants, U.S.S.R., were grown in sand cultures to which a Helriegel solution was added in accordance with a scheme described. Varying specified concentrations were applied at different stages of growths and the results were observed. The largest yields of both seeds and foliage, as well as the largest content of oil in the seeds, were obtained when the solutions applied were in least concentration at a time when the plants were in their earliest stage of growth.

1231. Golle, V. P., and Demidenko, T. T. 633.853.55-1.8
Critical periods of nutrition in the castor oil plant. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 281-3.
In this pot experiment with castor oil plants (*Ricinus communis*), the manurial elements, N, P and K, were withheld for limited periods during various stages of growth, in order to identify those critical stages during which the absence or presence of one or more of the manurial elements affects the subsequent yields of seed and foliage, the content of oil and the length of the growing period more markedly than they do during other stages.

1232. Golle, V. P., and Demidenko, T. T. 633.853-1.8
Levels of mineral nutrition in the castor oil plant. [Russian.]
Doklady Acad. Nauk S.S.S.R., 1940, **27**: 284-6.
Manures containing N, P and K in solution were applied at varying concentrations to castor oil plants on four successive occasions during their growth. The separate effects of N, P and K, applied variously, were shown in the total yield, yield of seed, percentage of oil, and absolute weight of seeds, all of which are here tabulated. Nitrogen was least required by the plants in the earliest and latest stages of growth. Phosphorus was best utilized in the earliest stage; its application, after that stage had passed, reduced yield. The oil content of the seeds varied with the amount of phosphorus applied. Potassium was needed by the plants mostly during their early stages of growth and was least useful when the seed was beginning to fill out.

233. McClellan, W. D. 633.853.55-2.4
A seedling blight of castor bean, *Ricinus communis*.
Phytopathology, 1944, **34**: 223-9, bibl. 10.
A seed-borne disease of castor beans, causing damping off and a seedling and foliage blight, is described. The causal organism is an *Alternaria* species, found to be identical with *Macrosporium compactum* Cooke and *M. cavarae* Parisi. It is given the new designation *Alternaria compacta* (Cooke) n. comb.

1234. Both, E. 633.859
Analyse des ersten rumänischen Opiums [Opium aus dem Banat]. **(The first Roumanian opium analysed.)**
Dtsch. Apoth. i. Osten, undated, Vol. **1**, Nr. 5, p. 137, from abstract *Dtsch. Heilpfl.*, 1944, **10**: 7.
The following analysis figures are given of Roumanian opium from experimental plots: water 7·45%; and of dried weight ash 2·01%, morphine 11·13%, narcotine 6·20%, codein 0·23%.

1235. Ballard, C. W., Cheney, R. H., and Pokorny, F. J. 633.88
Medicinal uses of drug plants cultivated in the medicinal plant garden of the Brooklyn Botanic Garden
Brooklyn bot. Gdn Record, 1943, **32**: 187-200, bibls.
An account of the medicinal properties of 90 plants growing at Brooklyn Botanic Garden.

1236. Iljin, M. M. 633.88
Chronicle of the work of the Department of Plant Raw Materials of the Komarov Botanical Institute of the Academy of Sciences, U.S.S.R. during the siege of a city. [Russian.]
Sovetskaja Botanika, 1942, No. 1-3, pp. 53-5.
The balsam which was obtained from *Abies* spp. and other conifers, and the derivatives from it were used in the healing of wounds, the products being sometimes compounded with castor oil and fish oils. The resin from *Ferula pyramidata* constituted the main ingredient of certain surgical dressings. Vitamin C was obtained from some of the conifers and from *Thlaspi arvense*; and yet another use for conifers and a Central Asian species of juniper was the preparation of an ethereal optical oil for immersion lenses. Preparations of sphagnum moss were employed for septic wounds, and were found to hasten healing by diminishing bacterial activity.

1237. Fedčenko, B. A. 633.88
Scientific notes—The Chilean plant, *Aristotelia*, and the possibility of cultivating it on the Black Sea coast. [Russian.]
Sovetskaja Botanika, 1942, No. 6, pp. 46-7.
The author traces the changes of name which a plant, now placed in the genus *Aristotelia*, has undergone since its discovery in Chile by the Italian, Molino, who called it *Cornus chilensis*. It is a plant which, on account of its medicinal properties should, in the author's opinion, be cultivated on the Black Sea coast. It is easily propagated by vegetative methods.

1238. Rowson, J. M. 633.88: 581.192
Increased alkaloidal contents of induced polyploids of *Datura*.
Nature, 1944, **154**: 81-2.
From experiments briefly described the provisional conclusion is drawn that the percentage of total alkaloidal contents of tetraploid plants of *Datura stramonium* and *D. tatula* are approximately double those of the diploid plants, while the proportions of the individual alkaloids present remain unchanged.

1239. White, E. P. 587.36: 547.94
Alkaloids of the *Leguminosae*. I-VII.
N.Z. J. Sci. Tech., 1943, **25**, Sec. B, pp. 93-112, bibl. 78.
About 210 species of legumes representing 68 genera were examined for alkaloids at Wellington, N.Z.

1240. Smolin, A. A. 633.913
Experimental elimination of dormancy in tau saghyz.
C.R. Acad. Sci., U.R.S.S., 1943, **38**: 96-8, bibl. 5.
Tau saghyz is liable to become dormant under conditions of summer drought. The author has evolved and successfully

tested methods described here, consisting broadly of cutting the leaves and irrigating, for eliminating this dormant period. Such treatment resulted in a yield of seed and roots after 3 years such as could previously only be expected after 5 or 7 years.

1241. GHILAROV, M. S. 633.913: 632.944
Naphthalene as a means to control seed pests of biennial kok saghyz.
C.R. Acad. Sci., U.R.S.S., 1942, **37**: 109-12, bibl. 4.

It is shown that dusting flower heads of *Taraxacum kok saghyz* with naphthalene dust results in a concentration of vapour which need not injure the plant or quality of seed. The concentration of naphthalene or other weak fumigant necessary to control such flower pests as *Olibrus bicolor* and *Ceutorrhynchus punctiger* with the same absence of injury to plant or seed still needs to be determined.

1242. ANON. 633.913
Rubber from plant sources.
J. Coun. sci. industr. Res. Aust., 1944, **17**: 49-58.

This report covers investigations on *Cryptostegia*, kok saghyz and guayule, carried out in Australia, and contains a note on synthetic rubber research. From large-scale observations and trials conducted by R. E. P. Dwyer, by the Queensland Department of Agriculture and Stock at Charters Towers, by F. C. Harry and W. L. Lober of the Department of Organic Chemistry, Sydney University and by W. E. Burnell, Rubber Technologist of the Department of Supply and Shipping, the conclusion has been reached that the rubber content of *Cryptostegia grandiflora*, cultivated or occurring naturally, is too low to render its exploitation economically feasible under Australian conditions. The suitability of *Taraxacum kok saghyz* was studied by the Department of Agriculture of South Australia in a comprehensive series of preliminary tests which were sufficiently promising to warrant the sowing of demonstration plots by private farmers in collaboration with the Department and the Council for Scientific and Industrial Research. The pre-treatment of the seed applied and the most favourable soil conditions are specified. It is thought that in view of the relative smallness of the root the rubber yield per acre is likely to be only moderate. The experience gained in growing guayule (*Parthenium argentatum*) has been too limited to make definite recommendations on this plant. Although climate and soil conditions appear to be suitable in certain areas of southern Australia and the problem of seed treatment could be solved, it is pointed out that the cost of seedling production would have to be reduced and yield and rubber content would have to be improved before the crop could be regarded as an economic proposition. Workers in South Australia are engaged in developing a method of seeding which would dispense with the raising of seedlings in the nursery.

1243. BONNER, J. 633.913-1.8
Effect of varying nutritional treatments on growth and rubber accumulation in guayule.
Bot. Gaz., 1944, **105**: 352-64, bibl. 4.

In two gravel culture pot experiments at the California Institute of Technology the effect of various nutrients on guayule growth and rubber content was tested. In the first 38 different solutions were used, in the second different forms of nitrogen. Growth and rubber accumulation were affected by nitrogen supply more than by that of other major elements. The highest level of rubber accumulation was in plants which received 14-17 milliequivalents of nitrogen as nitrate per litre of nutrient solution. These plants contained 5·5% rubber, based on dry weight of defoliated plant at the winter harvest. Growth and rubber accumulation were unfavourably influenced by phosphate deficiency. They were also depressed by low magnesium conditions, but the concentrations of calcium and potassium did not apparently affect them. As regards nitrogen those receiving their nitrogen in the form of nitrate did better than those receiving it as ammonium.

1244. WHITE, N. H., AND DICKSON, B. T. 633.913-2.4
A spot disease of guayule (*Parthenium argentatum* Gray).
J. Coun. sci. industr. Res. Aust., 1943, **16**: 258-60.

A seed-borne foliage disease of guayule, caused by a species of the fungus *Ramularia* and occurring in certain areas of Australia has been recorded for the first time. Seed treatment with calcium hypochlorite was found to control the disease.

1245. (IMPERIAL INSTITUTE.) 633.94
***Euphorbia tirucalli* resin from South Africa.**
Bull. imp. Inst., 1944, **42**: 1-13.

A full report on the resins of *Euphorbia tirucalli*. The resin might have a limited application in spirit varnishes as an alcoholic solution but would only be of use in the absence of better material. As a source of rubber the cost of production inhibits its exploitation even under present shortage conditions.

1246. FISCHER, H. 633.956
Der Kampferbasilik, eine neue Kampferpflanze des Ostens. **(Camphor basil, a new camphor plant of the East.)**
Dtsch. Apoth. Z., 1943, p. 294, from abstract *Dtsch. Heilpfl.*, 1944, **10**: 8.

An account of *Ocimum canum*, selected in Russia for camphor production. From an area of 300 hectares in the Ukraine 1·5 tons of camphor and the same amount of ethereal oils were obtained in 1942. The green parts of basil plants harvested in the Crimea were found to contain 2·26% ethereal oil at fruit maturity. The chemical composition of the oil is described and data are given on the changes in oil content at different hours of the day and under the influence of light and season. Figures on yield are also reported.

1247. MACLACHLAN, J. D. 635.127: 632.19: 546.27
Control of water-core of turnips by spraying with borax.
Sci. Agric., 1944, **24**: 327-31, bibl. 1.

Investigations here reported show that water core in the table turnip (or rutabaga) can be controlled by spraying the leaves with an aqueous solution of borax 2% or 8 lb. to 40 gal. water.

1248. PRIEBUS, K. 631.521: 635.13 +635.34
Die Keimlingsfarbe bei Herbstrüben- und Kohlsorten als Mittel zur Sortenunterscheidung. **(Seedling colour in autumn-sown carrots and cabbage varieties as a means of distinguishing varieties.)**
Gartenbauwiss., 1943, **18**: 27-31, bibl. 2.

A method has been worked out for autumn-sown carrots and cabbages of determining whether seed is true to name, seedling colour serving as an indicator.

1249. ANON. 635.2
***Oxalis deppei* as a food plant.**
Gdnrs' Chron., 1944, **115**: 196.

Attention is called to the value of the tubers of *Oxalis deppei* as a food and suggestions are made for its cultivation. Apparently 100 years ago a selected variety with very large tubers was grown for this purpose.

1250. WRIGHT, C. 635.25
Important aspects of onion cultivation.
Gdnrs' Chron., 1944, **115**: 200.

Successful onion cultivation depends on producing strong plants with plenty of leaf growth early in the season, for bulbing is governed by duration of light and takes place only over a limited period when the days are longest. Late plants make thick-necked bulbs which fail to store properly.

Sowing in heat in spring for later planting is a safe way in the north of ensuring bulbing. If facilities are not available seeds should be sown outside the second or third week in August. For autumn sowing the standard varieties will not do. Reliance and Autumn Queen are recommended. The drought often experienced in May and June in Great Britain is a danger and can only be overcome by using a deeply cultivated and well manured soil, or by artificial watering where means exist. Early growth may be promoted by feeding with nitrate of soda or sulphate of ammonia at the rate of 1 cwt. per acre or ⅛ oz. per sq. yd., the first application being early in June and the last (of 2 or 3) not later than mid-July. A fairly high potash content of the soil will assist ripening.

1251. KRICKL, M. 635.25
Neue Möglichkeiten zur Züchtung von Speisezwiebeln. **(New methods of onion breeding.)**
Forschungsdienst, 1943, **16**: 227-39, bibl. 4.

Onion yields increasing with the size of onion sets, the author selected both for size of set (up to 3 cm.) and for freedom from bolting. After 2 generations he was able to produce onion strains which combined large set size with reduced tendency to bolt. For breeding purposes preferably single bulbs should be used consisting of one part only, i.e. the growing point is surrounded by all the scales. Failing that, the bulbs showing the smallest number of divisions should be used. The breeding work was carried out at Vienna.

1252. GERM, H. 635.25: 631.531
Abnorme Keimpflanzen bei der Speisezwiebel (*Allium cepa* L.). **(Abnormal onion seedlings.)**
Gartenbauwiss., 1943, **18**: 98-100.

It is suggested that certain abnormalities in onion seedlings, studied in Vienna, were caused by storing the seed one year too long.

1253. JONES, L. H. 635.25: 632.19
Relation of weather conditions to onion blast.
Plant Physiol., 1944, **19**: 139-47, bibl. 5.

The physiological disease of onions known as blast is a form of severe sunscald and occurs when hot dry weather follows a period of cloud and wet. During the moist, subdued light conditions the plant develops soft tissue and a small root system and is unable to replace the lost moisture which occurs when transpiration again becomes rapid. In laboratory tests in which simulated weather conditions were employed blast could be produced at will. Local weather studies at Massachusetts State College supplied data which enabled a chart of superimposed dials to be constructed, which, when adjusted according to the weather factors represented thereon, allows the occurrence of blast to be foretold.

1254. D'OLIVEIRA, M. DE L. 635.25: 632.8
Um virus das liliáceas em Portugal. **(A virus of liliaceous plants in Portugal.)** [English summary ½ p.)
Agron. lusit., 1941, **3**: 115-9, bibl. 7.

Records the discovery near Lisbon of the virus disease of onions known in U.S.A. as " yellow dwarf ".

1255. JOLY, M. 635.263 + 635.262
Quelques remarques sur la culture de l' échalote et de l'ail en Kabylie. **(Notes on the cultivation of shallots and garlic in Kabylia, N. Africa.)**
Rev. Hort. Agric. Afr. N., 1942, **46**: 107-8.

Shallots. When Jersey shallots are planted in mid-December the bulbs give 5 or 6 offsets which rest until mid-January after making some preliminary growth, then go ahead vigorously but do not bulb. They can be used in salads. In February or March each of these vegetative offsets in its turn produces 5 or 6 more slender shoots, which by May will have formed sizeable clumps but still without bulbing. In good soil the ordinary white shallot behaves in much the same way provided that growth starts early, a matter dependent on rainfall and temperature. Shallots planted after 15 January only have one growth period and provide a good crop of healthy, long-keeping bulbs in July. *Garlic.* Whatever the variety, if planted early October to November in rich, deeply worked ground, in the axil of each leaf there appears in March or April a secondary shoot, forming eventually a group of heads, collectively of some size but with the cloves, except for the central one, too small for use. To avoid this, plantings can be made early on shallow ground worked to a maximum depth of 15 cm., or late after 15 January, on deep rich land. The last method produces the most normal results.

1256. MYERS, C. E. 635.34
The Penn State Ballhead cabbage. Some problems encountered in its development.
Bull. Pa agric. Exp. Stat. **430**, 1942, pp. 52, bibl. 13.

A very full account of the steps leading to the production of a cabbage which has now achieved fame. It was developed from a single plant chosen in 1912 and work on it continued till 1941. Methods for carrying plants over winter for seed production are described. The best method was to trench them in soil, and this is fully described. Experience with pests and diseases and their control are recorded. The actual production of cabbage seed under controlled conditions is detailed.

1257. GREEN, D. E., AND ASHWORTH, D. 635.34: 632.42
Clubroot of brassicas. Control test II.
J. roy. hort. Soc., 1944, **69**: 144-7.

Control test I was carried out at Wisley on summer sown cabbage (J. roy. hort. Soc., 1943, 68: 111-5; *H.A.*, 13: 461). The present test II, was carried out with spring sown cabbage on the same plots as before. The most successful treatments were with calomel dust, 4%, and a proprietary mixture, designated A, which contained this substance, each applied at the rate of 1½ oz. per sq. yd. and raked in before the drills were drawn. Lime and mercuric bichloride treatments and a proprietary substance, B, gave fair, though considerably less, control. In the case of calomel dust alone it was obvious that the dust of the previous year was also assisting, while with substance A, though not with substance B, this effect had been lost. It is concluded that though lime is the best long range treatment the use of calomel dust seems to be a good temporary measure.

1258. HOPKINS, J. C. F., AND PARDY, M. H. 635.34: 632.48
Diseases of fruit, flowers and vegetables in Southern Rhodesia. 8. Yellows disease of cabbage.
Rhod. agric. J., 1944, **41**: 63-7, bibl. 11.

The yellows disease of cabbage, caused by *Fusarium conglutinans*, was recorded in Southern Rhodesia for the first time in 1943. The symptoms, which in the early stages may be confused with black rot, are described. Field measures having failed to achieve control, 11 resistant varieties introduced from America are now being tested under local conditions.

1259. WALKER, J. C., STAHMANN, M. A., AND PRYOR, D. E. 635.34: 632.42
Efficacy of fungicidal transplanting liquids for control of clubroot of cabbage.
Phytopathology, 1944, **34**: 185-95, bibl. 28.

The use of mercuric chloride in the transplanting liquid proved very successful as a supplementary control measure against clubroot of cabbages on mineral soils, but particularly on mildly infected muck soils, where liming fails to neutralize the soil reaction. This compound applied in a solution 1-750 to 1-1,500 at a rate of 60-125 ml. per plant was the only fungicide from which appreciable benefit could

be derived. It is emphasized that the treatment must not be regarded as a substitute for such practices as soil rotation, seed-bed sanitation, etc.

1260. SMITH, W. P. C. 632.3: 635.34/35
Black rot of cabbage, cauliflower and related plants.
J. Dep. Agric. W. Aust., 1943, **20**: 298-302, bibl. 2.

Black rot of cabbages and other brassicas is a bacterial infection caused by *Bacterium campestre*, which is usually introduced to new areas by means of seed harvested from diseased plants. In wet weather it can be very destructive. Disinfection of seed and soil sterilization by means of formalin are two preventives suggested and full instructions are given for each treatment.

1261. JANSEN, J. A., AND RIETSEMA, I. 635.36
Spruitkoolvariëteiten op zandgrond. **(Trials with brussels sprouts on sandy soil.)**
Meded. Tuinbouw-voorlichtingsdienst **12**, 1939, pp. 28, Fl. 0.30.

The trials were held at Breda in Holland during 1938, 42 varieties being tested, many of them English. The most successful variety there was Beek Nieuw of local origin, though it does not follow that it would do equally well in another environment. The only English variety to be included in the first ten was The Canner, which is placed 5th and described as differing markedly from the ordinary English type. The sprouts on the English varieties with one exception were loosely packed. Danish varieties were on the whole large to very large and had a tendency to throw offshoots, as did one of the French sorts.

1262. KASSANIS, B. 632.8: 635.52+635.46
A virus attacking lettuce and dandelion.
Nature, 1944, **154**: 16.

The virus attacking lettuce somewhat severely in various parts of Britain is responsible also for the chlorotic spots often seen on dandelion (*Taraxacum officinale*). Symptoms in lettuce appear 1-2 weeks after infection and are shown by the bronzing of the young leaves as a result of the fine brown necrosis which forms along the veins and in the inter-veinal area. In the glasshouse this is followed by chlorosis, with dwarfing and malformation. In the open necrosis is the major symptom. The leaves become black and shrivelled and the plants are useless. The disease is more severe and easily distinguished from common lettuce mosaic, which has a different vector, *Myzus persicae*. *M. ornatus* and *M. pseudosolani* are vectors of the subject of this note and their behaviour seems distinct, in that they have to feed for 3 hours on a source of infection and cease to be infective within an hour. The name dandelion yellow mosaic is given.

1263. TAYLOR, G. G., AND LAI-YUNG LI. 635.52: 632.4
Ring spot. A fungus disease of winter lettuce.
N.Z. J. Agric., 1944, **68**: 193-4, bibl. 2.

Ring spot on winter lettuce, caused by the fungus *Marssonina panattoniana*, was recorded in New Zealand for the first time in 1942. Pale yellow spots on the main ribs of the oldest leaves appear as the first signs of infection, later the lesions turn brown and spread along the leaf stem. The disease was observed to occur in all major vegetable districts, in some places reducing the crop by 50% and rendering a further portion unsuitable for transport. Spraying experiments conducted at Auckland showed that the percentage of affected plants could be considerably reduced by spraying with bordeaux in the seedling bed and with Cuprox in the field. An additional advantage of spraying was that treated seedling plants gained in vigour as compared with untreated plants and that in the majority of cases infected plants, which had been treated, remained marketable. The spray programme consists in applications (1) of 3-4-50 bordeaux in the seedling bed at intervals of 2-3 weeks beginning soon after germination and (2) of Cuprox (5 lb.-100 gal.) at intervals of 3-4 weeks in the field. Cultural control measures would be rotation, reduction of density in and drainage of seedling bed and digging up of infected areas in the seedling bed.

1264. MAIER, W. 635.53: 632.19: 546.27
Eine Bormangelkrankheit des Sellerie (*Apium graveolens* L. var. *rapaceum* [Mill.] DC.). **(A boron deficiency disease of celeriac.)**
Gartenbauwiss., 1943, **18**: 47-58, bibl. 11.

Heart- and tuber-browning of celeriac, for the first time recorded in Germany, was studied at Geisenheim on Rhine. The disorder was found to be due to boron deficiency and could be remedied by an application of 4 g. borax per m². The borax increased the yield of tubers 3·5 times and that of leaves 3 times, improving the quality at the same time.

1265. NEWHALL, A. G. 635.53: 632.4
A serious storage rot of celery caused by the fungus *Ansatospora macrospora* n. gen.
Phytopathology, 1944, **34**: 92-105, bibl. 6.

The name black crown rot is proposed for a serious storage disease of the butt ends of celery. The causal fungus has been probably identified with *Cercospora macrospora* of Osterwalder or pansy leaf spot and certainly with the *Cercospora cari* of Westerdijk and van Luijk which causes anthracnose of caraway. The reasons for creating a new genus for it are given. The fungus, which may be soil-borne, can attack also leaves and stems of celery, stems and fruits of caraway and stems of parsley and it causes rot in apples and carrots. Control by dipping was not successful. The symptoms on celery butts do not develop until after 7 weeks of storage, thus damage can be avoided in infected fields by growing only early celery which is never stored.

1266. ZONN, S. V., AND PAVLOVA, E. A. 635.61/63: 631.586
The cultivation of *Cucurbitaceae* on desert shell-sands. [Russian.]
Sovetskaja Botanika, 1942, No. 4-5, pp. 43-55.

Though the desert sands along part of the coastline of the Caspian Sea are devoid of any vegetation, it is possible to grow cucurbits by the methods described in this article, if advantage is taken of the moisture which can be found at no great depth below the surface. The source of the moisture is the water of the Caspian Sea. This water penetrates inland along an underlying impervious stratum, and the upper portion of it, being much less saline than that of the Caspian Sea itself, is able to support plant life if the overlying sand is removed until the water is within reach of plant roots. On land prepared in this manner experiments were conducted which showed that such land was capable of producing good crops if manured with dung. Dung and other organic manures, however, are scarce in the country here described, and the quantities of them required to increase the water-holding capacity of the soil increase with every increase in the distance of the water-level below the surface. If such a distance be small only sufficient dung is required to provide a medium for soil organisms which, in turn, enable the growing crops to make the fullest possible use of artificial manures, especially if these are applied as a succession of top-dressings. Artificial manures alone could not yield a crop; applied together with dung, the amount usable by plants was limited by the salinity of the water; but as top-dressings larger quantities of them could be used, resulting in a corresponding increase of crop. N and P fertilizers were found, on the whole, to be more effective than K fertilizers. Despite the porous and friable nature of the sand, roots were unable to penetrate beyond the sphere of cultivation.

1267. Reichert, I., Palti, J., and Kapuler, B. 635.623: 632.4
Trials for the control of diseases of vegetable marrows. First report. [Hebrew, with English translation 9 pp.]
Bull. Rehovoth agric. Exp. Stat. **33**, 1943, pp. 30 + 9, bibl. 8.
Sulphur in various forms was found to offer the best means of controlling the chief diseases of vegetable marrows in Palestine, namely, powdery mildew (*Erysiphe cichoracearum*), leaf stalk rot (*Sclerotinia sclerotiorum* and *S. minor*) and fruit rots (*Pythium ultimum*, *Sclerotinia sclerotiorum* and *Rhizopus nigricans*). Details are given of precise treatments. Copper compounds gave a certain amount of success but were not so effective as sulphur, nor was the subsequent growth so good.

1268. Rumsey, E., and Hutton, E. M. 635.63: 631.531
Commercial extraction of cucumber seed by the acid method.
J. Coun. sci. industr. Res. Aust., 1943, **16**: 205-6.
Hutton's acid method of seed extraction from certain fruits (*ibid.*, 1943, 16: 97-103; *H.A.*, 13: 1417) was found to give good results with crystal apple cucumber in a trial on a commercial scale and under such weather conditions, namely wash water at 40° F., as would render fermentation impracticable. The lowest proportion of acid to pulp to ensure perfect separation of the seed was determined as 27 fluid ounces of commercial hydrochloric acid to 1 cwt. of pulp, to which 4 gallons of water were added for better distribution of the acid. The machinery for crushing and washing is described and the use of a grading trommel, to sieve out the heavy skins before washing, is recommended for seed extraction from pumpkins, water melons and long green cucumbers.

1269. Barson, D. M., and Ballinger, R. J. 631.531: 635.64 + 635.63
Extraction of tomato, cucumber and marrow seed with hydrochloric acid.
Agriculture, 1944, **51**: 178-84.
Following a method developed in Australia (see *J. Coun. sci. indust. Res., Aust.*, 1943, 16: 97-103; *H.A.*, 13: 1417) the extraction of tomato, cucumber and marrow seed with hydrochloric acid was tested at the National Institute of Agricultural Botany, Cambridge. The trials showed that good seed can be obtained by treating tomato and cucumber pulp for 30 minutes with 25 c.c. and 10 c.c. commercial hydrochloric acid respectively per lb. of pulp at approximately 60° F. For the extraction of marrow seed this method did not offer any advantage over the usual one employed of washing with water, but the trials had been confined to hard, overripe samples. Wooden or earthenware bowls should be used for the treatment.

1270. Beckley, E. 635.64
Outdoor tomato-growing in East Cornwall.
Agriculture, 1944, **51**: 75-8.
In order to demonstrate the possibility of growing outdoor tomatoes successfully in the humid climate of East Cornwall trials were conducted at Ellbridge Experimental Station. The plants were raised under Dutch lights and on the plot alternate plants were supported by canes, the others by sisal twine. In spite of very unfavourable weather the health of the crop was maintained by applying 9 wet sprays and 5 dry dustings in the period from 15 June to 17 September. Three methods of accelerating ripening were tried: (1) The plant was given a sharp pull to break the feeding roots; (2) it was almost completely defoliated; (3) as soon as the fruits began to turn yellow they were picked and placed on straw under shaded Dutch lights. The reaction to No. 1 treatment was found to be too slow, but treatment (2) was more successful and (3) gave marketable fruits within a week, there being no losses in the presence of adequate ventilation. Of 33 varieties, 8 were selected as under Cornish conditions yielding the highest amount of first-grade fruit.

1271. Kidson, E. B. 635.64: 577.16
Vitamin C content of different tomato varieties grown in the Nelson district.
N.Z. J. Sci. Tech., 1943, **25**, Sec. B, pp. 129-34, bibl. 2.
Tomatoes of the same apparent stage of ripeness and in the same position on the plant varied in vitamin C (ascorbic acid) content from plant to plant under the same manurial treatment. Ripe fruits within the individual bunch also differed in vitamin C content. The skin of ripe tomatoes was found to contain more than twice the vitamin C found in pulp or seeds per unit weight, but to contribute less than 10% of the vitamin C of the whole fruit. The juice did not show a constant relationship in vitamin C content to that of the whole tomato. Of the 14 varieties tested, Kidson was found to have the lowest vitamin C content, followed by Bonny Best. The differences between most of the other varieties was not great. For the Nelson plots the average figures ranged from 23·2 mg. to 30·8 mg. per 100 g. of the fresh fruit. Sunrise gave the highest, followed by Invincible (30·7 mg.) and Kondine (29·8 mg.). Fruit grown at Wakatu varied from 19·8 mg. for Kidson to 26·8 mg. for Invincible. [Author's summary.]

1272. Lyon, C. B., and Parks, R. Q. 635.64: 577.16: 546.27
Boron deficiency and the ascorbic-acid content of tomatoes.
Bot. Gaz., 1944, **105**: 392-3, bibl. 5.
Although lack of boron in an otherwise complete nutrient solution resulted in less growth and fruitfulness, severe deficiency symptoms and smaller boron content in vegetative parts of the plant, it did not significantly affect the ascorbic acid content of individual fruits.

1273. Hamner, C. L., Schomer, H. A., and Goodhue, L. D. 577.15.04
Aerosol, a new method of applying growth regulators to plants.
Science, 1944, **99**: 85.
An experiment was designed to determine the effectiveness of a growth substance in setting seedless fruit on tomatoes, when dispersed in aerosol form. Three grams naphthoxyacetic acid were dissolved in 27 g. of cyclohexanone and placed in a steel cylinder into which 270 g. of di-methyl ether was then forced under pressure. The plants to be treated were held for 16 hours in an airtight room into which the naphthoxyacetic acid was dispersed at 240 mg. per 1,000 cu. ft. The treated plants were then returned to the greenhouse. Fruit enlargement was observed in 3 days on the treated plants and none on the controls, 9 days later the treated plants had set an average of 3 fruits per plant, the controls 0·5. The average diameter of fruits after 36 days was 2·9 in. for the treated plants and 2·1 for the controls. Ten fruits collected at random from the treated plants were all seedless. The treatment was equally successful in the open air, the cylinder being held 1 ft. from the plant and the valve opened for about 1 second. The numbers of fruit set were comparable with those set in the greenhouse experiment. The controls set no fruit.

1274. Bailey, L. F., and McHargue, J. S. 635.64: 581.192
Enzyme activity in tomato fruits and leaves at different stages of development.
Amer. J. Bot., 1943, **30**: 763-6, bibl. 18.
At Kentucky Agricultural Experiment Station a study of the enzyme activities of the leaves and fruits of tomato plants showed that in the fruits catalase and peroxidase activity declined, while invertase activity increased with ripening but declined later. In the leaves activity of the 3 enzymes increased with increasing maturity and declined with senescence. Oxidase activity was highest in the youngest leaves and declined as the leaves developed.

1275. LYON, C. B., AND GARCIA, C. R. 635.64: 581.44: 631.8

Anatomical responses of tomato stems to variations in the macronutrient anion supply.

Bot. Gaz., 1944, **105**: 394-405, bibl. 11.

In sand culture experiments with an inbred strain of Bonny Best tomato the differing effects of 44 nutrient solutions on the anatomy of the plants were observed and the data statistically analysed. Considerable differences in stem diameter and area of component tissues could be correlated with differences in nutrient supply. No difference was found in the relative amount of cortex, but differences in the proportion of phloem, xylem and pith in stem sections and cellular differences in the material forming these different layers could be correlated with nutrient supply. These differences are significantly correlated with characteristics used as criteria of growth and fruitfulness.

1276. BAILEY, L. F., AND MCHARGUE, J. S. 631.544: 631.811.9

Effect of boron, copper, manganese and zinc on the enzyme activity of tomato and alfalfa plants grown in the greenhouse.

Plant Physiology, 1944, **19**: 105-16, bibl. 20.

As a result of the experiments at Kentucky Experiment Station here described the enzyme responses to treatment with any of the minor elements employed seem to be expressions of general metabolic conditions within the plant rather than direct influences of the particular minor elements. Certain exceptional enzyme responses obtained for each of the minor elements employed may be explained as a direct effect of one element on a particular enzyme, e.g. the response of oxidase to copper may be accounted for by the fact that polyphenol oxidase is a copper-protein enzyme.

1277. VAUGHAN, E. K. 635.64: 631.531.17

The use of ethyl mercury phosphate for treating tomato seed in New Jersey.

Phytopathology, 1944, **34**: 175-84, bibl. 7.

Ethyl mercury phosphate, which proved as effective as mercuric chloride for the treatment of tomato seed, was found to offer an advantage over the inorganic disinfectant in that its residue gives additional protection against recontamination and reduces incidence of seedling damping-off. As the result of tests conducted at the Virginia Polytechnic Institute, Blacksburg, Va, a 10-minute treatment (under laboratory conditions 5 minutes) in a 1-20,000 solution at 43°-80° F. is recommended. Treated seed may be dried and stored from one season to the next. A solution of ethyl mercury phosphate should not be used more than once.

1278. WALLACE, J. M., AND LESLEY, J. W. 635.64: 632.8

Recovery from curly top in the tomato in relation to strains of the virus.

Phytopathology, 1944, **34**: 116-23, bibl. 4.

At the California Citrus Experiment Station, Riverside, Guasave-A tomato plants inoculated with different strains of curly-top virus varied widely in their recovery, though in plants inoculated with a given strain the amount of injury before recovery, the degree of recovery and the time of initiation of recovery were similar in 2 years. The data showed clearly that the strains of virus decidedly influenced the amount of recovery, though the influence of climatic conditions is probably considerable; under high temperatures, for instance, plants are injured too severely and too rapidly for the recovery reaction to become effective. The importance of using only single virus strains or known strain combinations in investigations of this nature is evident.

1279. GOTTLIEB, D. 635.64: 632.48

The mechanism of wilting caused by *Fusarium bulbigenum* var. *lycopersici*.

Phytopathology, 1944, **34**: 41-59, bibl. 60.

Various hypotheses on the nature of vascular wilts are first briefly criticized. The suspicion that toxins in the tracheal fluid of tomato plants wilted by *Fusarium bulbigenum* are important in vascular wilts is demonstrated in the present investigation, though it was not possible to determine whether the toxin was a metabolic product of the fungus or a reaction product of the host due to the presence of the fungus. The toxins appeared to disturb the water balance of the plant and they increased the permeability of the cells. Plants in toxic fluids never wilted if transpiration was prevented, and plants wilted in toxic fluids returned to normal when placed in distilled water, while their subsequent replacement in toxic fluid again caused loss of turgidity. It seems that a continuous supply of toxins is necessary to maintain wilting. That tomato seedlings maintained in toxic filtrates for longer than 5 hours failed to regain turgidity is attributed to disorganization of the water relations having proceeded far enough to bring about other changes in their physiology. The toxins obtained from diseased tomato plants are stable to oxidation and spectrographic analysis revealed no significant differences between the emission-element content of the tracheal fluids and the toxicity of these fluids to tomato plants. A study of the nitrogen and amine content of the toxic and non-toxic tracheal fluids might determine whether the toxic amine fraction which has been found by other workers in the fungal filtrates is also present in the tracheal fluids of diseased tomato plants.

1280. JENKINS, C. F. H. 632.73: 632.8: 635.64

Thrips, and their relation to spotted wilt and other plant injury.

J. Dep. Agric. W. Aust., 1943, **20**: 272-5.

A note on the general life history of thrips in W. Australia. Spotted wilt of tomato is the most important thrips-borne virus in the State and can be carried by the onion thrip (*Thrips tabaci*) and the carnation thrips (*Frankliniella insularis*). Twelve different formulae are given for control baits, contact sprays and dusts, including reputedly effective substitutes for the usual tartar emetic spray now difficult to procure. These are nicotine sulphate 1 qt., honey, cane or corn syrup 3 gal., water 83 gal., or Paris green 7 oz., molasses 2 qt., water 83 gal. Mention is made of the treatment of gladiolus corms by immersion in water at 120° F. for 10 minutes or 112° F. for 30 minutes; by enclosing in a box or paper bag with flaked naphthalene at the rate of 1 oz. per 100 corms for a month or by dipping just before planting in corrosive sublimate 1 oz. to water 6 gal.

1281. GAUCH, H. G., AND WADLEIGH, C. H. 635.65: 631.415.3

Effects of high salt concentrations on growth of bean plants.

Bot. Gaz., 1944, **105**: 379-87, bibl. 13.

Red Kidney beans were grown to the flowering stage in a basic culture solution to which various amounts of different salts had been added. At isosmotic concentrations growth was very similar in the NaCl, $CaCl_2$ and Na_2SO_4 series but was markedly depressed where $MgCl_2$ and $MgSO_4$ had been added. This depression is attributed to the specific toxicity of magnesium. The symptoms of this toxicity in the bean plant are described.

1282. SCHARRER, K., AND SCHREIBER, R. 635.65: 631.83 + 631.811.6

Gefässversuche über den Einfluss gesteigerter Kalium- und Magnesiumdüngung auf den Eiweissertrag der Ackerbohne (*Vicia faba*). **(Pot experiments on the influence of increased potash and magnesium applications on the protein yield of beans.)**

Bodenk. PflErnähr., 1943, **30**: 360-70, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. pp. 2-3.

It was shown that beans require high applications of potash but little magnesium.

1283. HUBBELING, N. 635.65: 632.3/4 + 632.8
De invloed van de uitwendige omstandigheden bij het optreden van boonenziekten. (**The influence of environment on the occurrence of bean diseases.**)
Tijdschr. PlZiekt., 1942, **48**: 225-34, from abstract *Zbl. Bakt.*, 1943, **106**: 208.
The relation between the occurrence of bean diseases in the summer of 1941 and climatic conditions during the same period was studied in Holland. The severe incidence of aphids caused considerable virus infection manifest as *Phaseolus* virus 1, yellow mosaic and "steengrauw" (*Phaseolus* virus 2 ?). Another virus, previously wrongly described as bacteriosis may be identical with *Nicotiana* virus 11. The symptoms of this disease were marked during the hot season, the characteristic ring spots appearing later. Halo blight was not observed in June and July, but very frequently in August. Anthracnose of the stem, caused by *Ascochyta boltshauseri* and *A. phaseolarum* was insignificant in mid-summer, but in August heavy infection of the leaves and pods occurred. *Colletotrichum lindemuthianum*, *Fusarium* sp., *Sclerotinia sclerotiorum* and *Botrytis cinerea* occurred also during cool, damp weather.

1284. WALLS, E. P. 635.655
Edible soybeans.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 53-7, bibl. 9.
A note of work at the Maryland Station aimed at the selection and breeding of varieties of soybean suitable for use as vegetables fresh or canned.

1285. GUKOVA, M. M., AND BUTKEVICH, W. S. 635.655
Influence of aeration and soil temperature on the development of inoculated and non-inoculated soya plants.
C.R. Acad. Sci. U.R.S.S., 1941, **31**: 937-40, bibl. 8.
Trials show that with very small amounts of bound nitrogen in the soil the development of inoculated soya plants can be considerably improved by appropriately changing the conditions of aeration and temperature. In some cases the yield can be increased by the introduction of additional nitrogen into the soil.

1286. PROBST, A. H. 635.655: 631.8 + 631.432
Influence of fertilizer, fertilizer placement, soil moisture content, and soil type on the emergence of soybeans.
J. Amer. Soc. Agron., 1944, **36**: 111-20, bibl. 8.
Three analyses of fertilizers applied at 6 different rates, 2 methods of placement, 2 soil moisture levels and 2 soil types were used in experiments over 3 years with the Dunfield variety of soybean. The data show, with a few exceptions, that there is some reduction in emergence of soybean seedlings when heavy dressings of fertilizer are applied in contact with the seed, irrespective of soil moisture content or soil type, and that this reduction tends to be proportional to the amount of fertilizer supplied. Phosphate alone was less injurious to emergence than potash alone and in combination these elements show cumulative deleterious effects.

1287. PETTY, M. A. 635.655: 632.3/4
Soybean diseases on the Eastern shore of Maryland.
Trans. Peninsula hort. Soc., 1943, 1944, pp. 58-62.
Eight diseases of soybean are considered and brief notes are given on the possibility of control, in some cases by seed treatment.

1288. HEINZE, K. 635.655: 632.8
Die Feldbereinigung bei Sojakulturen als Schutzmassnahme gegen die Ausbreitung des virösen Sojamosaiks. Vorl. Mitt. (**Field clearance in soya bean growing as a control measure against the spread of mosaic. Preliminary report.**)
Züchter, 1942, **14**: 254-8, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 23.
Mosaic has to be considered as the most dangerous disease of soyabeans in Germany; it is transmitted by seed, usually causing more damage to the black varieties than to the yellow ones. Inspections of experimental plots in 3 different districts showed that 4-5 weeks after sowing 23% of the plants were affected, and that the disease spread considerably further during the summer. Removing the diseased plants was found to check the spread, hence the difference between cleaned and untreated plots was very noticeable. The question, whether late season infections will still affect the seed, is being studied at the Biologische Reichsanstalt für Land-u. Forstwirtschaft, Berlin-Dahlem, where the investigations were carried out.

1289. WITHROW, A. P., AND BIEBEL, J. P. 635.655: 632.944
Nicotine fumigation injury in Biloxi soybean.
Phytopathology, 1944, **34**: 256-7, being *J. Pap. Purdue Univ. agric. Exp. Stat.* **121**.
Marginal and interveinal chlorosis was consistently found to develop in young leaves of Biloxi soybean grown in the greenhouse following fumigation with nicotine.

1290. DARKANBAEV, T. B. 635.656: 631.83
Effect of potassium on proteolytic activity in pea leaves.
C.R. Acad. Sci. U.R.S.S., 1942, **36**: 108-11, bibl. 11.
Trials at the Biochemical Institute indicate that the effect of potassium on the protein metabolism of pea leaves may be directed both towards synthesis and hydrolysis. The activity of proteolytic enzymes is only stimulated by potassium, but the direction of the process depends upon conditions created within the cells.

1291. RUBIN, B. A., AND LATIKOVA, O. T. 577.15: 635.656
Enzyme action in peas in relation to the development and productivity of the plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1940, **27**: 34-7.
In late and early pea varieties, both of the sugar and common types, enzyme action was studied with leaves, seed and pods during the period before flowering, flowering itself, and when the seed was ripening. The action of synthesis by saccharase in the leaves relative to that of hydrolysis was reduced in all varieties without exception during the flowering stage. Such a relationship was more pronounced in the ordinary than in the sugar pea. In some varieties synthesis was diminished absolutely, in others it was increased, but hydrolysis was increased to an even higher degree. During the ripening of the seed, synthesis prevailed over hydrolysis more than at any other stage, the hydrolytic action of invertase in particular being diminished. The synthetic action of proteinase in the leaves during the interval between flowering and seed ripening inclusive was observed to increase in three out of the four varieties investigated. During the waxy stage of ripeness, invertase in the seed is wholly synthetic in action. The antagonism which has been observed by previous investigators between the synthetic actions of invertase and proteinase in the seed has been tested and confirmed in this experiment. In sugar peas synthesis by proteinase is less active than in ordinary peas, in which invertase synthesis is the more important. No such destruction was perceived in the leaves. Synthesis both by invertase and proteinase was more active in late than in early varieties of pea.

1292. WALLER, C. W. 635.656: 632.5
A poisonous pea contaminate.
Science, 1944, **99**: 80.
The three nightshades, *Solanum nigrum*, black nightshade, *S. nigrum* var. *villosum* or yellow nightshade and *S. triflorum* or cutleaved nightshade are becoming common weeds in pea fields of the United States and form a serious problem for the pea canning industry since their berries are difficult to separate from the peas. Adulteration of peas with nightshade berries is prohibited, but doubt exists, in the absence of scientific evidence, of the toxicity of the yellow and cutleaved nightshades, for some actually look on them as a food. Black nightshade contains solanine, a poisonous substance, and the content varies considerably with ecological conditions. Work in progress at the School of Pharmacy, State College of Washington, has now established the toxicity of *S. triflorum*; solanidine has been found in the berries and its presence is also indicated in *S. nigrum* var. *villosum*.

1293. HARRINGTON, C. D., AND OTHERS. 635.656: 632.753
Measurement of the resistance of peas to aphids.
J. agric. Res., 1943, **67**: 369-87, bibl. 8.
A description is given of technique whereby the resistance of peas to aphids can be tested with accuracy and rapidity. The method can, moreover, be adapted to the requirements of the breeder. Partial resistance is found in the Onward variety, but no variety has yet been found exhibiting a high degree of resistance.

1294. RAMSBOTTOM, J. 635.8
Fungi and modern affairs.
Nature, 1944, **153**: 636-41, bibl. 2.
The substance of 3 lectures at the Royal Institution, London, delivered on 15, 22 and 29 February, 1944. Much information is provided of the more spectacular effects of the influence of fungi on modern economy. The notion commonly prevailing that most of the larger fungi are inedible is dispelled by the statement that less than a dozen species are in any way poisonous whereas 300 or more are edible. The poisonous species are named and the toxic principles in the more deadly are discussed. Fungi harmful to buildings are mentioned. Some account is given of the role of fungi as causal agents of disease in plants, man, animals and insects, and in the destruction of stored products. Allusion is made to Pasteur's work and to the frequency with which odd facts mentioned more or less incidentally by him have in recent years, especially under the stress of war, been followed up and turned to good account. The work of Thaysen and colleagues at the Chemical Research Laboratory in the discovery of *Torula utilis* as a source of a protein only slightly less nutritive than good animal protein is to prove of value in the post-war feeding of ravaged Europe and is to lead to large-scale manufacture in Jamaica where molasses is abundant, —200 g. molasses gives 50-60 g. of the food yeast. In Germany the yeast is now being used with hydrolysed wood as a source of sugar. The commercial production of citric acid by *Aspergillus niger* in U.S.A. at the rate of 10 million lb. annually within 8 years killed the Italian production of calcium citrate from citrus juices, formerly 90% of the world's supply. The position was later regulated by the International Citric Acid Agreement. *Aspergillus niger* is, in slightly differing environments productive of oxalic acid, ethyl alcohol and mannitol. These products are also formed by many other species. Some substances can only be built up by a single species or a few related species. The work of Raistrick in this field is mentioned. The effects of synergism or its contrary aspect, antagonism, as factors in plant disease are described, the outstanding recent example of antagonism being the effect of penicillin (from *Penicillium notatum* and others) on *Staphylococcus*. Penicillin has proved to be the most bacteriostatic substance known and its effect on therapeutics is likely to be profound. The history of the discovery and manufacture of this and allied products concludes the paper.

1295. VASILJKOV, B. P. 635.8
An explanation concerning the mushroom "gruzdj" and references to it in Russian literature and ordinary life.
Sovetskaja Botanika, 1942, No. 1-3, pp. 18-27.
The mushroom, known in Russia by the name of "gruzdj", is eaten only after it has been pickled in brine, and is then a popular food. Neither frying, boiling nor any other culinary process is able to destroy the acrid taste which the mushroom possesses when raw. There still exists much uncertainty regarding the Latin equivalent of the Russian name of this and, indeed, of many mushrooms known and used in Russia. Gruzdj has in the past been defined as *Agaricus piperatus* and *Lactarius piperatus*; but its true name, according to the author, should be *Lactarius resinus*. A common mistake has been to describe it correctly but to call it *L. piperatus*. Drawings and descriptions of both species are given in the present article, as well as descriptions of others related to and resembling them both.

1296. LINTZEL, W. 635.8
Über den Nährwert des Eiweisses essbarer Pilze.
(The nutritional value of the protein of edible fungi.)
Chemikerztg., 1943, Nr. 3/4, pp. 33-4, from abstract *Dtsch. Heilpfl.*, 1944, **10**: 8.
The protein content of a number of edible fungi is given. The nutritional value of the protein of fungi was found to be only slightly inferior to that of meat protein.

1297. PRAVDIN, L. F., AND JAKIMOV, P. A. 667.211.4
***Salix caprea*: a tree valuable to industry.** [Russian.]
Sovetskaja Botanika, 1940, No. 1, pp. 58-62.
The amount of tannides in the bark of this species of willow averages about 16·5% of the dry weight. Sometimes the content may be as much as 19% or 20%. These figures may be compared with those of 10-year-old *Salix cinerea* or *S. nigricans* trees, the bark of which contains about 13% of tannides. The tree grows readily and to a large size. The rate of growth is greatest when the trees are 2 or 3 years old, but falls off when they are 20 years old. At the age of 8-10 years the trees are already large and have a thick layer of bark. From trees 8 years old, 3,000 per hectare, the yield of raw bark is 0·9 tons per ha.; from those 25 years old, 800 per ha., it is 4·8 tons; and from those 35 years old, 200 per ha., it is 10·0 tons. The timber is also valuable. The trees have a useful life of between 40 and 50 years.

1298. WEIDHAAS, H. 635.1/7: 519
Experimentelle Studien an Gemüse über die Entnahme von Durchschnittsproben zur chemischen Qualitätsbestimmung unter Anwendung statistischer Methoden. **(Experimental studies on the taking of average vegetable samples for a chemical determination of quality with application of statistical methods.)**
Bodenk. PflErnähr., 1942, **30**: 1-35, and thesis Berlin, 1941, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 29.

SCHMIDT, H. 631.531.17
Samenbeizung. **(Seed pickling.)**
Leistungssteigerung im Gartenbau, H. **13**, 1943, pp. 52, RM. 1.65, from review *Gartenbauwiss.*, 1943, Vol. **18**, abstr. pp. 25-6.

MOREAU, R. E. 633.491
The climatic background to the problem of potato varieties for East Africa II.
E. Afr. agric. J., 1944, **9**: 203-12, bibl. 72.

McKinney, H. H., and Clayton, E. E. 633.71-2.8
Acute and chronic symptoms in the tobacco ring-spot disease.
Phytopathology, 1944, **34**: 60-76, bibl. 10.

Kapadia, G. A. 633.85: 581.45
A note on the structure of the petiole of an anomalous leaf of *Helianthus annuus*, Linn. (*Compositae*).
Curr. Sci., 1944, **13**: 49-50, bibl. 8.

Graves, A. H. 633.88
A brief historical survey of the use of plants in medicine.
Brooklyn bot. Gdn Record, 1943, **32**: 169-86, bibl. in text.

Cromwell, B. T. 633.88: 581.192
Studies on the synthesis of hyoscyamine in *Atropa belladonna* L. and *Datura stramonium* L.
Biochem. J., 1943, **37**: 717-22, bibl. 13.

Brannekow, T. 633.88
Die wilden und angebauten Heilkräuter Bulgariens. **(Bulgaria's wild and cultivated medicinal plants.)**
Bulgar. Wochensch., Vol. **4**, No. 176, from reprint *Dtsch. Heilpfl.*, 1943, **9**: 123-4.

Rollins, R. C. 633.913
Evidence for natural hybridity between guayule (*Parthenium argentatum*) and mariola *Parthenium incanum*).
Amer. J. Bot., 1944, **31**: 93-9, bibl. 10.

Hering, E. M. 635.31: 632.77
Ein neuer Spargelfeind. Die Zwergspargelfliege (*Ptochomyza asparagi* g.n., sp.n.). **(A new asparagus pest: *Ptochomyza asparagi*.)**
Z. Pflkrankh., 1942, **52**: 529-33, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 24.

Crafts, A. S., and Lorenz, O. A. 635.61/63
Fruit growth and food transport in cucurbits.
Plant Physiol., 1944, **19**: 131-8, bibl. 6.

Hartmair, V. 635.63: 547.944.6
Colchicininduzierte Polyploidie bei Gurken. (Vorl. Mitt.). **(Polyploidy in cucumbers induced by colchicine.** Prelim. commun.)
Züchter, 1943, **15**: 13-6, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. p. 17.

Ott, A. C., and Ball, C. D. 635.65: 581.192
The isolation of stigmasterol and β-sitosterol from the common bean, *Phaseolus vulgaris*.
J. Amer. chem. Soc., 1944, **66**: 489-91, bibl. 14.

Baker, A. D., and Perron, J. P. 635.656: 632.78
Life history studies of the pea moth, *Laspeyresia nigricana* (Steph.), on the Gaspe coast.
Sci. Agric., 1944, **24**: 341-9, bibl. 14, being *Contr. Div. Ent. Sci. Service* **2291**.

Kligman, A. M. 635.8
Some cultural and genetic problems in the cultivation of the mushroom, *Agaricus campestris* Fr.
Amer. J. Bot., 1943, **30**: 745-63, bibl. 36.

FLOWER GROWING.

1299. Argentina, Ministerio de Agricultura. 635.9(82): 31
Primer censo nacional de floricultura 1938-39. **(A first national census of floriculture in Argentina)**, 1940, pp. 40.

Details are given of labour and capital employed in flower growing throughout Argentina, of the areas under flowers and of the quantities of particular flowers produced in the different provinces.

1300. Baranovskiĭ, A. L. 635.9
Scientific notes—the utilisation of some ornamental plants. [Russian.]
Sovetskaja Botanika, 1940, No. 1, pp. 85-90.

The author describes several flowering and other ornamental plants, as yet little known to cultivation in Russia or still wild, which are being grown at the botanical gardens of the Žitomir Agricultural Institute, and are worthy of attention from the plant breeder. Most of them are known to the English horticulturist.

1301. Post, K. 612.014.44: 635.9
Effects of daylength and temperature on growth and flowering of some florist crops.
Bull. Cornell agric. Exp. Stat. **787**, 1942, pp. 70, bibl. 52.

This bulletin should be extremely suggestive to the flower grower who has ready control of his greenhouse temperature and lighting and wishes to get the best results from his various plants. The requirements of some 80 kinds of flowering plant are considered individually. The interdependence of length of day and temperature for required results is stressed. Among generally applicable recommendations the following may be noted: The maximum light efficiency can be obtained by the use of Mazda lamps fitted with proper reflectors. The benches to be lighted should be screened from those not to be lighted with white cloth. Lamps of particular wattage should be used for particular bench lengths, e.g. 25-watt lamps spaced at 3-foot intervals 2 ft. above the plants for a 3-ft. bench. A flasher giving 40 to 60 seconds of light followed by an equal period of darkness should be used for spring annuals and one giving 30 seconds of light and 60 seconds of darkness for asters and for delaying flowering in autumn- and winter-flowering plants. Enough additional light should be used each day to produce a 15-hour day; this necessitates increasing the amount of light each month during the autumn and reducing it each month in the spring (under Ithaca, N. York, conditions). The period of year for treatment depends on the result desired and the plant. Any covering used for the reduction of daylight must entirely exclude light, the period of treatment differing according to plant. Temperature requirements are equally important under both treatments, some plants needing a temperature below 65° F. for bud formation and others temperatures over 60° F. Between 60° and 65° F. the reaction is less definite. Recommendations for individual plants under Ithaca conditions are summarized, notes being given for each plant with regard to (1) temperatures necessary (*a*) for growing, (*b*) for bud formation, (2) when to use artificial light, (3) the effects of long days, (4) when to darken and (5) the effects of short days.

1302. Mauldin, M. P. 631.535
Anthracite coal ashes for rooting cuttings.
Science, 1944, **99**: 145.

The apparently beneficial effect of sifted hard anthracite coal ashes for the propagation of cuttings of chrysanthemums, roses, etc., is recorded. It is claimed that damping off did not occur in the cutting beds and that the plants showed exceptional vigour. Soil treatment is reported to have been unnecessary, whilst water retention was adequate and aeration excellent.

1303. Mullard, S. R. 635.936.69: 631.589: 663.61
Soilless cultivation of carnations by the sub-irrigation system.
Reprint from *Carnation Yearb.*, 1942, pp. 8.

The author describes with illustrations and diagram the methods successfully used by him for the cultivation of carnations in solution in washed gravel. He states that in summer the solutions were kept at N 350-400 p.p.m., P 60 and 80 p.p.m., K 100 p.p.m. and Mg 48 p.p.m., and in

winter at N 100-150 p.p.m., P 60-80 p.p.m., K 300-350 p.p.m. and Mg 48 p.p.m., and that testing of the solutions was done every 10-14 days when new salts were added, though he does not state what these salts were. It may be noted that trace elements were added monthly and iron in solution was sprayed on the surface every 3 months. The pH, which was kept at 6, was adjusted twice weekly in winter and on alternate days in summer at the time when the supply tanks were topped up with fresh water. It was necessary to empty and clean the tanks only 3 times a year, once being at the beginning of winter when the values of N and K were finally adjusted.

1304. BICKERTON, J. M. 635.936.69: 632.48
Fusarium wilt of carnations caused by *Fusarium dianthi* Prill. et Del.
Bull. Cornell agric. Exp. Stat. **788**, 1942, pp. 31, bibl. 40.

The main source of carnation wilt appears to be infected soil in the greenhouse and field. The selection of healthy cuttings and the use of resistant varieties are recommended. New soil should be used when possible. Otherwise the severity of the disease on susceptible varieties grown in infected soil can be appreciably decreased and flower production increased by soil treatment with either formaldehyde or chloropicrin.

1305. HUTCHINSON, J. 635.974: 581.162.3
Pollination of the honeysuckle.
Gdnrs' Chron., 1944, **116**: 24.

An illustration of the manner in which pollination is effected in the honeysuckle, *Lonicera periclymenum*.

1306. KOSO-POLIANSKY, V. M. 635.939.9: 581.162.3: 581.46
Pollination in *Lobelia inflata* L.
C.R. Acad. Sci. U.R.S.S., 1942, **37**: 69-72, bibl. 12.

The author describes and discusses the morphology and development of the flower of *Lobelia inflata*, which, being in point of fact organized as a highly adapted entomophilous allogamist, nevertheless behaves in practice largely as a mechanical autogamist.

1307. GUIRFANOVA, K., AND TOKIN, B. 631.535.7: 635.938.46
Shoots sent forth by a leaf of *Begonia rex* not severed from parent plant.
C.R. Açad. Sci. U.R.S.S., 1942, **35**: 122-4, bibl. 1.

Circular holes, 3-5 mm. in diameter, were punched in one or two of the leaves of *Begonia rex*, the leaf becoming sieve-like in consequence. The plants were kept in propagation boxes in a humid atmosphere at a temperature of from 20° to 25° C. At the end of a month about two-thirds of the leaves had fallen off, but on the 16 which remained roots appeared on the edges of the circles and a week later fresh leaves made their appearance on the upper side of 10 of the leaves.

1308. DRAYTON, F. L. 635.944: 632.4
Botrytis or core rot of gladiolus corms. A storage disease.
Canad. Hort., 1944, **67**: 27-8.

In a contribution from the Division of Botany and Plant Pathology, Ottawa, *Botrytis* disease of gladiolus corms is described and certain precautions are suggested. The disease develops chiefly on corms which are not properly dried off. The corms when brought in from the field should be stored on shallow, wire-mesh-bottomed trays stacked or racked to admit free movement of air. Temperature should be held at 55°-60°, since lower temperatures facilitate spread of the fungus. Drying should take from a week to 10 days but must not be so hurried as to cause excessive loss of water or shrivelling of the corms. After this stage is complete the exterior of the corms will be resistant and temperature may be allowed to drop to 40° F. and the corms stored in deeper layers, provided ventilation is maintained. Forced draught is unnecessary. When cleaning later, corms with discoloured scales should be picked out and destroyed, but, in the case of a valuable variety, the diseased portion might be excised and the corms planted in the usual way, but at a distance from healthy stock. There is some varietal susceptibility. A corrosive sublimate soak as recommended against thrips will remove surface infection but will not reach decayed tissue within the corm.

1309. INGRAM, C. 635.977.32: 631.523
Apparent manifestation of a paternal habit [in cherry].
Gdnrs' Chron., 1944, **115**: 178.

The Formosan cherry, *Prunus campanulata*, as is common with such semi-tropical plants whose growing season is governed more by monsoon rains than the coming of spring, flowers in England in January. Its seeds when sown germinated in late autumn, those of 4 other cherries from temperate regions sown at the same time germinated the following spring. When in 1942 *P. dawyckensis* was hand-fertilized with the pollen of 4 different cherries, *P. campanulata*, *P. sargentii*, *P. cyclamina* and *P. avium* (Early Rivers) the resulting seeds of the campanulata cross germinated at least a week or ten days before the first of the crosses with the temperate species. In 1943 with *P. subhirtella* as the seed parent and a bush cherry from Kashmir, *P. bifrons*, and *P. campanulata* as pollinators the 5 seeds from the *campanulata* cross all germinated between 29 January and 6 February while the solitary seed from *P. bifrons* did not germinate till 22 March. It is suggested that it may be justifiably assumed that the habit of precocious germination is here such a potent factor that it is not only transmitted to the adult hybrid (as can be presumed) but is actually manifested in the embryo.

1310. INGRAM, C. 635.977.32
The Botanical Magazine plate of Sargent's cherry.
Gdnrs' Chron., 1944, **115**: 217-8.

A recent examination of the herbarium specimens at Kew of the tree from which *Prunus sargentii* was drawn for the *Botanical Magazine* (t. 8411) shows that the specimens are not the *P. sargentii* described by Rehder (*Mitt. deutsch. dendr. Ges.*, 1908, 17: 159) but probably a pink-flowered form of *P. serrulata* or a hybrid of *P. sargentii*. The characters in which the herbarium specimens fail to resemble the type are noted. The origin of the tree from which the specimens were taken is traced and it is suggested that the seed from which the tree was grown, being collected in Japan, was taken from cultivated trees which were very probably cross-fertilized.

1311. HOWARD, A. L. 634.975
The cedar tree.
Nature, 1944, **153**: 595-8, bibl. in text.

An account of the cedar tree and its exploitation from the earliest times.

1312. ABBISS, H. W. 635.936.751
The commercial production of anemones.
Reprinted from articles in *Market Grower and Salesman* 1936, 1939, pp. 15.

ABBISS, H. W. (CORNWALL EDUCATION CTTEE.). 635.938.422
Commercial violet production.
Reprinted from articles in *Market Grower and Salesman* 1938, pp. 8.

MERTENS, F. 635.966
Ein Beitrag zur Frage der Verlängerung der Haltbarkeit von Schnittblumen durch Zusätze. **(Improving the keeping quality of cut flowers by adding saponins.)**
Gartenbauwiss., 1943, **18**: 32-9, bibl. 9.

KOTTHOFF, P. 635.944: 632.4
Der rote Brenner der *Amaryllis*. **(An *Amaryllis* disease caused by *Stagonospora curtisii*.)**
Kranke Pfl., 1942, **19**: 106-7, from abstract *Zbl. Bakt.*, 1943, **106**: 206.

CITRUS* AND SUB-TROPICALS.

1313. GREIG, A. M. W. 634.3(931)
The citrus growing industry.
N.Z. J. Agric., 1944, **68**: 195-9.
The author asserts that the figures for imported sweet oranges, and to a lesser extent for imported American grapefruit, are so high as to warrant an almost unlimited expansion of the sweet orange production in New Zealand and to encourage a certain increase of the area devoted to grapefruit. Intending growers are advised how to establish a citrus orchard.

1314. FAUVEL, J. H. [TANAKA, T.]. 634.3
Les pays d'origine des espèces du genre *citrus* et les contrées d'expansion en Extrême-Orient. **(The origin and spread of citrus species in the Far East.)**
Rev. Hort. Agric. Afr. N., 1942, **46**: 33-9.
A résumé of a paper by T. Tanaka. No direct reference is given but the substance appears to be similar to that of a lecture delivered to the Association of Economic Biologists, Coimbatore, India, in November, 1935, and recorded in their *Proceedings*, Vol. 3, 1935 (1936), and does not substantially differ from the author's views as often expressed elsewhere. He contends that the origin of all citrus lies in Assam and Upper Burma. The spread and origin of many species are briefly traced.

1315. FAUVEL, J. H. [TANAKA, T.]. 634.3
Les meilleurs citrus d'Extrême-Orient. **(The best citrus of the Far East.)**
Rev. Hort. Agric. Afr. N., 1942, **46**: 62-8.
A compilation from T. Tanaka's paper given at the 3rd Panpacific Science Congress, Tokio, 1926, the compiler explaining that a translation had only recently become available. The best citrus varieties, it is claimed, are still unknown outside the Far East. Four of these are here described: Ponkan, largely grown in Formosa, closely resembling the Santara orange of N. India. The principal stocks used for it are *Poncirus trifoliata*, *Citrus sunki* and *C. microcarpa* (Calamondin). There are several varieties. In Formosa the government have selected one in particular for extensive propagation, Tankan, known in Formosa as Nienkan and botanically as *C. tankan*. This species is native to Formosa and forms dense stands in the mountain districts. The flavour is sweet and aromatic but less agreeable than that of Ponkan. An improved and later variety is known as Kôshô-Tankan. Haili may be considered as a variety of Tankan with larger fruits. Mention without description is made of some other varieties popular in China but little known elsewhere.

1316. TUCUMAN. 63(072)(824.5)
La estacion experimental agricola de Tucumán. **(The Tucuman Agricultural Experiment Station.)**
Bol. Est. exp. agric. Tucumán **44**, 1943, pp. 37.
An account of the origin and foundation of the station in 1906 and of the various decrees on which it stands. Its organization is described and notes are given of past and present staff. Its horticultural efforts have succeeded in rehabilitating the orange industry, largely as the result of working on sour orange and so avoiding gummosis. It has also shown the desirability of finding oranges which will be ready for market at times when there is not a glut. Lue Gim Gong is promising in this respect.

1317. HU CHANG-CHIH AND WU CHIEN-CHI. 634.31-1.521
Selection studies of Hwang-kuo (sweet orange) at Kin-tang and Kiang-Tsing in Szechuan, Paper II.
Reprinted from *Nanking J.*, 1942, **11**: 51-72, being *Reprinted series* (*Chengtu*) **37**.
A two-year selection of the sweet orange of Szechuan has shown the great differences existing between different strains. Descriptions are given of the fruit of some 20 clones considered promising. Progenies of these have been vegetatively produced since the spring of 1939 and are now being studied.

1318. FROST, H. B., AND KRUG, C. A. 634.322: 575.252
Diploid-tetraploid periclinal chimeras as bud variants in citrus.
Genetics, 1942, **27**: 619-34, bibl. 19.
This paper deals with the cytological nature of a bud variant which originated on a progeny tree of a hybrid mandarin (King × Dancy).

1319. JONES, W. W., AND OTHERS.
634.323: 581.192: 577.16
A note on ascorbic acid: nitrogen relationships in grapefruit.
Science, 1944, **99**: 101-2.
Extensive tests conducted at the Agricultural Experiment Station, University of Arizona, showed a negative correlation to exist in Marsh grapefruit between nitrogen and ascorbic acid content. Fruits from trees so managed as to give a low nitrogen content at harvest were consistently found to contain 20-25% more ascorbic acid than those from trees with a higher nitrogen level. Grapefruit juice gave a negative correlation coefficient between nitrogen and ascorbic acid content of 0·91. Incidentally, the values reported for ascorbic acid content in grapefruit juice from low level nitrogen trees are exceptionally high: ·53 - ·59 mg./ml. for fruits picked 30 September, 1942 and an average of ·44 - ·48 mg./ml. for fruits harvested during the period 30 September, 1942 to 2 February, 1943.

1320. JOHNSTON, J. C. 634.3-1.8-2.19
Notes on citrus fertilization.
Calif. Citrogr., 1944, **29**: 118.
The most common deficiency in Californian citrus orchards is nitrogen, less common deficiencies are zinc, copper and manganese. A generally satisfactory annual nitrogen application is 2 to 3 lb. per tree or 10 to 15 lb. of a 20% N fertilizer. At least half the nitrogen requirement can be supplied by yard manure or some similar organic material. Zinc is best supplied as 5 lb. zinc sulphate, 2½ lb. hydrated lime or soda ash, water 100 gal., or zinc oxide 2 or 3 lb., water 100 gal., a formula which may cause some burning. Treatment should be supplied often enough to prevent mottle leaf and is most effective if applied at the beginning of a growth flush. Copper may be supplied by 5-5-100 bordeaux mixture, manganese by 3 lb. manganese sulphate, 1½ lb. soda ash, 100 gal. water. Three to 5 gal. sprayed on a mature tree is enough. Fumigation should not follow for at least 8 months. Soil applications have not been effective in California. The importance of using a leguminous rather than a non-leguminous cover crop is stressed. The cost often outweighs the benefit of cover crops. The formation of nitrite (NO_2) and its toxic effects on the trees are discussed. Its importance and prevalence are not yet fully understood. Farm manure should be applied in late summer or early autumn. Nitrogen should be broadcast and where leaching is a factor applied in several small doses.

1321. PILLSBURY, A. F., COMPTON, O. C., AND PICKER, W. E. 634.3-1.67
Irrigation-water requirements of citrus in the south coastal basin of California.
Bull. Calif. agric. Exp. Stat. **686**, 1944, pp. 1-19.
A report on the transpiration of water by depth for citrus trees in the coastal and interior areas of the south coastal basin of California as determined by soil-moisture sampling. Transpiration averaged 16 inches depth during the normal irrigation season for large, vigorous and mature trees in

* See also 1174.

Orange County, depth of moisture loss decreasing from 36% in the first foot to 3% in the sixth foot. For younger, less vigorous trees the seasonal transpiration in the same area averaged 11 inches. In the interior climatic zone of San Bernardino and Riverside Counties, transpiration of citrus trees in excellent and good condition averaged 21 inches for the normal irrigation season, and those in fair condition averaged 17 inches. Transpiration will vary from about 50% to 80% of the total irrigation application. Average depth of moisture loss decreased from 36% in the first foot to 5% in the sixth foot. In both areas, rate of transpiration increased from a minimum in winter to a maximum in July and August, and then decreased. Salt-balance studies indicated that the irrigation practices plus rainfall under these conditions were adequate to prevent salt accumulations in the soil.

A.F.P.

1322. Fawcett, H. S., Perry, J. C., and Johnston, J. C. 634.3-2.8

The stubborn disease of citrus.

Calif. Citrogr., 1944, **29**: 146-7.

Haas, A. R. C., Klotz, L. J., and Johnston, J. C.

Acorn disease in oranges.

Calif. Citrogr., 1944, **29**: 148, 168.

A description is given of what is probably a virus disease of citrus. It was first observed in 1921, though investigation did not properly begin till 1938, at the Riverside Experiment Station, California. Leaf symptoms consist in an untimely autumn growth of small branches and leaves, the latter being broader and shorter and bending more upward on each side of the midrib than in healthy trees. The leaves become somewhat chlorotic and apparently more numerous in a given space but later shed to excess. There is a brush-like appearance due to the growth of multiple buds and to the shorter internodes. Fruiting diminishes, and the fruit is irregular in size and form, paler and with a greater percentage of off-bloom fruit than is normal. Late in the season some fruit may show a characteristic acorn shape. In these fruits the rind, generally normal though rather uneven at the stem end, becomes thinner and smoother till it has become quite thin at the stylar end. Sometimes the stem end rind is also thin. In Navels the navel end takes on a pinkish cast (" pink nose "), in grapefruit there is a blue colour in the albido of the stylar end (" blue nose " or " blue albido "). The stylar end often has a disagreeable odour. So far no other source of infection than by budding from afflicted trees has been determined.

1323. Fawcett, H. S., and Cochran, L. C. 634.31-2.8

A method of inducing bark-shelling for treatment of certain tree diseases.

Phytopathology, 1944, **34**: 240-4.

A method of treating psorosis of citrus trees by causing the bark to shell off without injuring the cambium, thus allowing new healthy bark to be formed, has been sought at the Citrus Experiment Station, University of California. Dinitro-o-cyclohexylphenol (DNOCHP) was found to have the desired effect, if applied with a brush to Valencia and Washington Navel orange bark at a concentration of approximately 1% by weight dissolved in kerosene or in medicinal grade white mineral oil. Other carriers and toxic substances are being tested. It is anticipated that this new chemical method will prove a useful substitute for bark scraping also in the treatment of other bark diseases.

1324. Klotz, L. J. 634.3-2.411

Brown rot and gummosis infections causing serious losses.

Calif. Citrogr., 1944, **29**: 116.

Suggestions are made for dealing with the exceptionally severe attacks of brown rot and gummosis at present prevailing in Californian citrus orchards. Even late in the season low-hanging fruit could be protected. The lower foliage up to a height of 3 ft. could be sprayed with bordeaux mixture 3-3-100 or, if cyanide fumigation is to follow, with 1-1-100. Zinc sulphate may be added to reduce fumigation injury. Tetrachloroquinone 1 lb. per 100 gal. gave satisfactory protection in field and laboratory experiments. A dry spreader of sodium lauryl sulphate, 4 oz. per 100 gal., mixed with the fungicide failed to adhere to the plant surface when exposed to a combination of heavy wind and rain. A medium flowable oil emulsion 1 qt. per 100 gal. has now been added, experimentally, as a sticker. Immersion of picked fruit for 2 to 4 minutes in water or treating solution (unspecified) at 115°-120° F. is very effective, but a slight preliminary wilting is necessary to avoid the spotting caused by liberation of the rind oil. Gummosis of crown and trunk is very prevalent. As treatment the diseased bark and ¼ to ½ in. strip of healthy bark beyond the margin of the diseased portion is cut away, using a heavy, sharp knife for the smooth portion of the trunk and a scale bark scraper for the irregular bud union, crown and root areas. The exposed cambium should not be scraped. The entire area is then dusted with spray-dried bordeaux, zinc-copper-lime—also spray-dried—or tetrachloroquinone, or is painted with 1% permanganate of potash solution or with a suspension of the consistency of house paint of one of the dust materials mentioned. After a week the treated lesion is painted with white lead paint or other sealing material.

1325. Henderson, C. F., and McBurnie, H. V. 634.3-2.654.2

Sampling technique for determining populations of the citrus red mite and its predators.

Circ. U.S. Dep. Agric. **671**, 1943, pp. 11.

An account is given of the methods and apparatus used in the collection of the citrus red mite (*Paratetranychus citri*) and its predators. The collecting apparatus, which is mounted on a car, brushes off the mites and eggs from citrus foliage and fruit and concentrates them on adhesive-covered glass discs for counting. A counting card is used in which 25% of the area is illuminated. Tests showed that between 80% and 90% of the mites and their eggs were thus accounted for. Predators were counted in the field on the same leaves prior to the brushing. The size of sampling errors is discussed.

1326. Persing, C. A., and Brown, L. R. 634.3-2.73

The present status of citrus thrips control [in California].

Calif. Citrogr., 1944, **29**: 149, 160-1, bibl. 3.

The areas in which occur strains of thrips resistant to tartar emetic are named and are probably increasing. In non-resistant areas the tartar emetic spray is still the most economical and effective. The spray should contain tartar emetic and sugar in an amount that will supply 4 lb. of each ingredient per acre for lemons or 2 lb. of each for oranges, grapefruit and tangerines applied in 100 to 200 gal. water per acre, using broom guns or a boom sprayer. Resistant thrips may be controlled with nicotine sulphate 1 quart (40% nicotine) + granulated sugar 4 lb. per 100 gal. Nicotine sulphate alone or in combination with molasses or brown sugar gave inferior results at Riverside Experiment Station. Alkaline materials such as lime-sulphur, bordeaux mixture, zinc or manganese mixtures with lime or soda ash are not compatible with nicotine sulphate and should not be included in the tank, nor should zinc oxide. If oil sprays against scale have to be used, the sulphate-sugar spray should not be applied within 2 weeks either before or after. Nicotine sulphate sprays should be applied in early May before thrips become abundant and in early August before they again increase. Some types of spraying implements are discussed.

1327. KLEIN, H. Z., AND PAKER, M. 634.1/8-2.77
Biological studies on the Mediterranean fruit fly (*Ceratitis capitata*) in the Jordan Valley. [Hebrew, English summary 7 pp.]
Bull. Rehovoth agric. Exp. Stat. **32**, 1942, pp. 33+7.
A study of the life history of the fruit fly in Palestine indicates that only a partial control of specific orchard areas is at present possible. This could be achieved by early picking of the citrus fruit, so creating a citrus host-free period from early April. Care should be taken to remove all and every fruit from the grove, leaving none there during the spring and summer. Data are tabulated but it seems a pity, in view of the comprehensive English summary, that the legends of the 20 tables are exclusively in Hebrew.

1328. HAMERSMA, P. J. 634.31-2.951: 581.192
The influence of the insecticides, cryolite and sodium fluosilicate, on the quality and fluorine content of oranges.
Sci. Bull. S. Afr. Dep. Agr. **236**, 1943, pp. 50, bibl. 69, 3d., being *Chem. Series* **172**.
The bulletin is a condensation of the author's thesis in Afrikaans approved for the D.Sc. degree by the Pretoria University in 1940. The effectiveness of cryolite and sodium fluosilicate for the control of the American bollworm (*Heliothis obsoleta*) on oranges having been demonstrated by other workers, the aim of the present investigation was to determine (1) whether these two arsenic substitutes were harmful to fruit quality, and (2) whether added fluorine was retained by the oranges. Four statistically planned tests with Valencias and Navels, conducted in the Northern and Western Transvaal over a period of years, showed that the insecticides have no significant influence on fruit quality or on its keeping quality. Mature oranges were found to have retained no added fluorine, if the fruit was treated while 5-10 mm. in diameter. The fluorine residue on the peel of Valencias, treated shortly before picking, could be sufficiently removed by normal machine washing, in the case of fluosilicate even more readily than in that of cryolite.

1329. ANON. 581.192: 577.16
Vitamin variation in fruits, plants, due chiefly to variety and sunlight.
Calif. Citrogr., 1944, **29**: 128, reprinted from *Nutrition Research*.
A brief review of recent work by various investigators which tends to substantiate the statement in the above title.

1330. READ, J. 581.9(94)
Chemistry of the Australian bush.
Endeavour, 1944, **3**: 47-56, bibl. 15.
An account is given of some of the more important Australian eucalypts, particular note being taken of the various essential oils that can be obtained from them with a more brief mention of those from various other native plants. The scope of the article can be gathered from the sub-headings—The eucalyptus oil industry; Chemical characteristics of eucalypts; An evolutionary theory [Baker and Smith's]; More about Australian plant chemistry; Phytochemical and chemical problems.

1331. MANNS, T. F. 633.492
Sweet potato seed bed management, seed and sprout treatment.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 74-84.
Notes are given on sweet potato seedbeds and their management, seed treatment against disease, the value of hill selection, the advantages of changing the soil, important diseases, i.e. black rot, stem wilt, soft rot, pox and scurf and their control, on seed selection, on the value of root dip treatments and on general practice with regard to disease elimination.

1332. STEPHENS, S. G. 633.51-1.541.11
Grafting experiments with cotton.
Reprinted [with 2 other articles] from *Trop. Agriculture, Trin.*, 1943, Vol. **20**, No. 2, pp. 7, bibl. 5.
An account of two grafting experiments with cotton, the object of one of which, on a field scale, was to compare the growth rates, earliness of flowering, types of bolling curve and yields of selected scions on a range of stocks. The purpose of the other, a small-scale trial, was to measure the mutual interaction of stock and scion in 2 varieties as shown by rate of growth of scion and rootstock. The resultant data show that in cotton the length of the period of stock/scion adjustment depends on the habits of the varieties grafted, adjustment being considerably slower when perennial or semi-perennial varieties are involved.

1333. ESDORN, I., AND NOLDE, I. 633.85: 551.566.1
Die fettliefernden Bäume und Sträucher des tropischen Afrika. **(The fat-producing trees and shrubs of tropical Africa.)**
Beitr. z. Kolonialforsch., Vol. **4**, Berlin, Dietr. Reimer, 1943 (no date), from review *Dtsch. Heilpfl.*, 1944, **10**: 7-8.
179 different plants from about 40 families are described and partly illustrated in this detailed monograph of fat-producing plants in tropical Africa. The distribution of *Butyrospermum parkii* in Africa is recorded in a map.

1334. DROSDOFF, M. 633.85: 581.192
Leaf composition in relation to the mineral nutrition of tung trees.
Soil Sci., 1944, **57**: 281-91, bibl. 29.
The tung tree being comparatively new to America, it appeared desirable to determine its nutritional requirements by leaf analysis. As a preliminary step, the composition of the leaf, as influenced by date of sampling, position of leaf on shoot, fruiting and non-fruiting terminals on the same trees, soil conditions and fertilizer treatment, was studied in 3 tung orchards in Florida and Louisiana. Samples were analysed at 3 dates to determine the content and seasonal trends of nitrogen, phosphorus, potassium, calcium, magnesium, manganese, iron and ash. The results are tabulated. Soil conditions were found to have a greater influence on leaf composition than any of the other factors considered.

1335. (HODGSON, R. W.) 634.451-2.19-1.541.11
Persimmon losses solved.
Calif. Citrogr., 1944, **29**: 147.
The excessive immature fruit drop of Hachiya persimmon, of which 90% of California commercial orchards consist, is attributed to over-invigoration by the *lotus* rootstock customarily used. Fruit drop can be controlled by girdling the trunk or limbs in early summer, but a more permanent solution would be to use the oriental persimmon as its own rootstock.

1336. HEAD, W., AND FORDHAM, R. D. 634.651
The papaya or papeeta.
Bull. U.P. Dep. Agric., Fruit Ser. **2**, 1943, pp. 6, 2 annas.
The cultivation of *Carica papaya* in the United Provinces, India, and the control of its diseases are described.

1337. SAYED, I. A. 634.651: 581.46
Sex variation in papaw (*Carica papaya*, Linn).
Trop. Agriculturist, 1943, **99**: 143-5, bibl. 4.
Three papaw plants were found at the Agricultural Experiment Station, Paradeniya, which were characterized by the production of abundant flower panicles producing sex forms of variable structural modifications in distinct contrast to all the present knowledge of variation in papaw flowers. The variations are described.

1338. PALMER, D. F. 634.653-2.96
Avocados and their insect allies.
Calif. Citrogr., 1944, **29**: 162-3.
Gives some account of biological control of some avocado insect pests, in particular of the long-tailed mealy bug *Pseudococcus longispinus*, by *Tetracnemus peregrinus* and *Anarophus sydneyensis*.

1339. CARNEVALE, J. A. 634.653
El cultivo de la palta. (**Cultivation of the avocado.**)
Alm. Minist. Agric. B. Aires, 1944, **19**: 89-92.
Suggestions for the cultivation of the avocado in Argentina. The more technical data are based on the work of the research station at Porto Rico. The stock seeds will keep a short time if stratified in sand kept slightly damp. When sowing in nursery beds it is customary to cover with straw which may be temporarily removed, if rainfall is heavy, to allow the excess moisture to evaporate. The straw is finally removed when germination occurs, about 6 weeks after sowing. The seedlings are each transplanted to some form of receptacle, the strongest being selected in the case of the grouped polyembryonic embryos. They will be ready for budding in one or two years. The time to bud is in March and April (in Argentina) though it can also be done from August to November. The bud wood after cutting is kept in damp (not wet) moss for 10 days, buds so treated subsequently producing a much higher percentage of take. If buds, from which the leaves have abscissed, are chosen, there is less chance of infection than via a freshly cut petiole, or the petioles may be cut off a fortnight before the bud wood is cut to allow time for healing of the scar. The climatic region most suited to the hardier types of avocado includes Corrientes, Formosa and Chaco.

TROPICAL CROPS.

1340. WAKEFIELD, A. J. 63(729.2)
Memorandum of agricultural development in Jamaica.
J. Jamaica agric. Soc., 1943, **47**: 156-217.
The memorandum by the Agricultural Adviser to the Comptroller for Development and Welfare in the West Indies presents a survey of the agricultural conditions of Jamaica and suggests the requisites necessary to promote the social and economic life of the people. The report is very comprehensive, dealing in detail with every commercial crop grown in the island, as well as livestock, soil erosion, scientific research, agricultural education and land tenure, marketing and co-operatives, in fact with every matter likely to have a bearing on the improvement of agriculture in Jamaica.

1341. POUND, F. J. 632.951
Barbasco. A growing industry in the Amazon valley.
Proc. agric. Soc. Trin. Tob., 1943, **43**: 269, 271, 273, 275.
A brief account of the collection of wild *Lonchocarpus nicou* and other species by the Amazon Indians and suggestions for its cultivation in Trinidad as a source of rotenone and a substitute for derris. In good samples rotenone concentration may amount to 15% of the dry matter. Cultural treatment suggested is similar to the usual way of treating derris. Besides the root the stems also have a small rotenone content and the question is raised whether this fibre could not be used in the form of book binding or board as a protection against the bookworm which is very destructive in the tropics.

1342. HIGBEE, E. C. 632.951
Lagunas—barbasco capital of the world.
Agric. Amer., 1944, **4**: 83-6, 95-6.
An account of the cultivation of the rotenone-bearing *Lonchocarpus utilis* or barbasco, in the village of Lagunas, Peru. The author designates it " the foremost production centre of insect rotenone ". The place contains only 2,500 inhabitants and the methods of cultivation are primitive in the extreme. There are no pack or draught animals, or machinery, all work being done by hand labour. No attempt has so far been made to improve the rotenone content which, in air-dry roots, is 5%.

1343. LESTER, A. H. 633.526.22
Henequen from Cuba.
Agric. Amer., 1944, **4**: 69-72.
A description of the cultivation of the fibre plant henequen, *Agava fourcroydes*, a native of Yucutan, in Cuba. Propagation is by means of suckers set directly in the field, spacing being approximately 4 ft. × 8 ft. Leaves are cut as they mature from the bottom of the plant, the cutting period lasting from 11 to 15 years. First cutting is possible 4 years after planting and the plant should bear not less than 12 mature leaves. At least 16 to 20 growing leaves must be left on the plant. The cutting of 17 leaves per plant should be possible twice yearly. The leaves are decorticated mechanically and the cleaned fibre is sun dried for 1 day before baling. The pulp is at present wasted. There is some discussion on production methods, which are by no means perfect or the most economical possible, fields being left to die out which could well have been maintained in production. The economics of the crop are discussed and its possible future. Production seems to be held back by the long period elapsing between planting and cropping, which means that the grower has no certainty as to what prices will be when his crop matures.

1344. JAYARAMAN, V. 631.415: 633.72
Soil *p*H as a factor in the growth of tea supply plants.
Plant. Chron., 1944, **39**: 171-6, bibl. 9.
Although it could be shown in pot trials with tea supply plants, conducted at the U.P.A.S.I. Tea Experimental Station, India, that sulphur applications lowered the soil *p*H and had a markedly beneficial effect on the whole plant, economic considerations appear to rule out the employment of this method as a practical measure. It is therefore suggested that low acid patches in a tea plantation should be used to grow green manure crops.

1345. MICHEL, L. 633.73
Pratique de la culture du caféier arabica par les indigènes du Ruanda Nord. (**Native coffee cultivation in N. Ruanda.**)
Bull. agric. Congo belge, 1943, **34**: 109-21, bibl. 4.
The method whereby the native coffee growers are painlessly constrained to cultivate their coffee on scientific methods adapted to their capacity is described. A number of native travelling instructors are allotted to each district under a chief instructor, also a native, who is responsible to a European. On arrival in the locality the travelling instructor requires the chief to provide 8 growers, who work under his orders for a week, to be succeeded the following week by 8 others, and so on till the work is done. This consists in visiting the various native holdings and performing such of the more technical work as is necessary. A system of co-operation between neighbours is built up and every grower has thus taken a hand in the maintenance of the local coffee production. The spraying programme is undertaken by a different instructor and worked on the same principle. Mulching, composting and manuring is practised on a scale that has greatly enriched the soil. A special 3-legged step ladder which has not to be supported by the tree and can be easily constructed without nails has been introduced and has proved popular for picking and pruning.

Cleaning the coffee by fermentation is discouraged as detrimental to flavour and the proper method with wood ashes and frequent washings is described. All these operations are classed as those to be done by the grower, with the responsibility on the local chief. Pruning, shading, replacements and pest and disease control are done under the direct supervision of the agricultural instructor. Pruning is discussed fairly fully, the multiple stem system being mainly in use. Shade to young coffee is given by bananas which have been retained because the native likes them. The coffee actually is much better without shade. Replacements are made from seeds sown at stake. Transplanting is at present unsuccessful because of the careless way it is done and the long distance between nurseries and planting ground.

1346. PATTABHIRAMAN, T. V., AND MAYNE, W. W. 633.73-2.76

The emergence of adults of coffee stem borer (*Xylotrechus quadripes* Chevr.) from cut coffee stems.

Plant. Chron., 1944, **39**: 153-7.

The influence of the climate on the emergence of adults of the coffee stem borer is described, as shown by experiments carried out at the Mysore Coffee Experiment Station and observed in the field. From the results obtained it is concluded that treatment would be most effective 15-20 days after the peak period of emergence, i.e. about the second week of December.

1347. BARNLEY, A. W. 632.93

A blower for powdered insecticide.

Mon. Bull. Coffee Bd Kenya, 1944, **9**: 19.

An illustrated description of how to make a very efficient powder blower out of an old motor car hand pump, a screw top sweet bottle as container and 2 pieces of tin plate for nozzle. Any moderate native blacksmith should be able to do the work.

1348. HUMPHRIES, E. C. 633.74-2.19

Wilt of cacao fruits (*Theobroma cacao*)III. Changes in mineral content during development.*

Ann. Bot. Lond., 1944, **8**: 57-70, bibl. 8.

During the development of a cacao fruit the wall shows a large increase in phosphorus during the pre-ripening and ripening stages and a loss during the subsequent stage. The relative (logarithmic) rates of uptake of N, P, K and Ca by the wall are constant and equal during the period from 25 to 57 days. After 57 days the rates are less but are maintained up to 107 days, though the relative rates of uptake are no longer equal to one another, K alone maintaining a rate equal to that of dry matter increase. Mg behaves somewhat differently to the other elements. The relative rates of uptake for NPK and Ca in the pulp are similar to those in the wall in the first phase but are maintained for 107 days. In the form of their oxides K, Ca, Mg and P constitute over 90% of the total ash of the kernel of a ripe cacao bean. During the first 75 days of fruit development mineral substances travel via the xylem, thus water strain or competition in such substances is likely to cause wilting, a suggestion, supported by previous observations, which had shown the first period of 75 days in the development of the fruit to be critical. This long critical period may be due to late development of the fertilized ovum.

1349. POSNETTE, A. F. 633.74-2.8

The diagnosis of swollen-shoot disease of cacao.

Trop. Agriculture, Trin., 1944, **21**: 56-8, bibl. 4.

Previous descriptions of the symptoms of swollen shoot disease of cacao have failed to give a complete picture of symptomatology, since they have not taken into account the different strains of the virus and have overlooked the basis of pattern in the leaf chlorosis. Even the present account cannot be regarded as final, for apparently new strains, each with slight differences of virulence and mosaic pattern, are constantly occurring. *Leaf symptoms.* In general all the strains exhibit, especially in the young leaves, a vein clearing principle, i.e. the chlorophyll fails to develop along the sides of the veins and to a varying distance from them. The chlorotic symptoms are described in full detail. The only chlorosis likely to be mistaken for swollen shoot mosaic is one in which the cleared areas are between the fine veins, which are not cleared but outlined in green, a condition produced apparently by the presence of excess phosphate in alkaline solution. This chlorosis is accompanied by characteristic leaf distortion, the leaves being narrower than normal, especially at the base and with an exaggerated apical point, and usually twisted to one side (sickle leaf). Distortion from swollen shoot takes the form of a crinkle in which the areas between the main veins bulge upwards (dorsally) till the whole leaf is strongly puckered. Another form of distortion is caused by the death of large areas between the many veins which are then drawn together, twisting the leaf. There is usually a decrease in leaf size with each successive flush until, in extreme cases, the leaves die and fall when less than an inch long, soon after the opening of the bud. Frequent inspections are necessary or the leaves may wilt and fall unnoticed, the critical time being when the leaf is changing from pink to green. *Pod symptoms.* Dwarfed and rounded pods occur in virulent cases. A dark green mottling (pink when developed in direct sunlight) on unripe pods, becoming green or yellow and disappearing when the pod is fully ripe has been the first sign of infection in transmission experiments with bearing trees. Mottling is easily confused with thrips damage and with skin irregularities. *Stem symptoms.* Swellings are unmistakable. They occur at the end of shoots of which the terminal point has been checked or killed or in fan branches at or rarely just below a node. Short internodes are symptomatic but may be caused by heavy psyllid infection. Trees which flush later than the surrounding trees should be suspect. A flush may be missed entirely, and this condition can be recognized by the absence of green, soft wood at the branch tips and by the presence of an undue proportion of old leaves. Die-back is a symptom of virulent strains and is not necessarily associated with shoot swellings. *Root symptoms.* Swellings occur on the tap roots of young trees and on the main laterals of older ones. *Flower symptoms.* No flower abnormality is shown, but flowers drop soon after opening. Infected trees bearing heavy crops probably set before or soon after infection. *Field diagnosis.* Since the symptoms described can each be produced by some other agency, diagnosis must largely depend upon experience and the impression given by the whole symptom picture. However, in most outbreaks of more than about 10 infected trees diagnostic symptoms will almost certainly be found on one or other of them.

* Parts I and II. *Ann. Bot. Lond.*, 1943, 7: 31-44 and 45-61; *H.A.*, 13: 599.

1350. W., E. D. H. 633.821

Vanilla.

J. Jamaica agric. Soc., 1943, **47**: 253-6.

Notes are given on the cultivation of vanilla, *Vanilla planifolia* Soil should be rich and light with a good mulch of decaying vegetable matter. Temperature should be between 70° and 90° F. with a well distributed annual rainfall of 100 in. or irrigation. Light shade is desirable and possibly shelter from wind. Propagation is by cuttings 4 to 5 ft. long. The support should be living evergreen trees of small size which do not shed their bark, for example orange or cashew. Spacing should be 4 ft.×8 ft. or 5 ft.×10 ft. Pollination is by hand and the method is described. The pods are picked when the tips become yellow, about 8 months after fertilization. A vine yields from 15 to 45 pods a year or 100 to 180 cured pods per acre. Notes are given on curing.

1351. CHILD, R., AND NATHANAEL, W. R. N. 633.85

Hydnocarpus oils in Ceylon. Part II.

Trop. Agriculturist, 1943, **99**: 140-2, bibl. 7.

In part I the results of an analysis of the seeds of *Hydnocarpus*

wightiana and *H. kurzii* were discussed [*ibid.*, 1942, 98: 1: 2-7; *H.A.*, 13: 603]. Part II deals with the seeds of *H. anthelmintica*. Of the 3 species *H. wightiana* is to be preferred for cultivation on account of better keeping quality and of the higher oil content of the seeds and a better suitability of the oil for medical needs. *H. anthelmintica* has the added disadvantage of a higher percentage of shell on the seed.

1352. STOFFELS, E. H. J. 633.88.51
L'exploitation des plantations de *Cinchona ledgeriana*. **(Management of *Cinchona ledgeriana* plantations.)**
Bull. agric. Congo belge, 1943, **34**: 72-9.

The management of *Cinchona* plantations in Kivu, Belgian Congo, is discussed with special reference to the lessons to be learnt from the methods employed in Java. In Java the best yields are obtained by close planting, say 90×90 cm., with subsequent thinning conducted as follows. In the 3rd year the branches of all the trees are cut back about 6 ft. or to within 3 ft. of the ground and the bark of these loppings is collected. Pruning continues in the 4th year and weakly trees are cut out entirely. In the 5th and 6th years thinning by tree removal begins. It is axiomatic that, when the branches of adjoining trees begin to interlace, pruning or tree removal should be carried out, and on a well managed plantation this should occur annually. The importance of light and air to the interior of the plantation has been proved. Selective thinning is advised, choosing particularly any spindly trees, or ledgers which approach the succirubra type. Trees showing promise of good future development should be retained. They are easily recognized by their solid trunk and heavy branches and thick bark. This selection requires careful supervision by the management; it cannot profitably be left to native labour. The trees reach full development in 15 to 30 years in Java. When their branches no longer meet overhead or when the yield from prunings and thinnings falls below 70 kg. sulphate of quinine per acre the plantation is cut down. The African plantations are still too young for the age of maturity to be determined and it will probably depend on altitude. The bark is peeled by hand; the local method is described. The small twigs of pencil thickness form one-eighth of the prunings or 12·5% of the yield, but a man can only strip 3 kg. of this bark per 8 hour day as against 10·33 kg. and 16 kg. for branches of 1 in. and over 1 in. thickness respectively. In Java, if the price of quinine falls below a certain level, the small twigs are not used. The stripped bark in Africa is given a preliminary drying in the sun and broken into small pieces by child labour, a final drying is given by artificial means, preferably at a temperature of 75° C. At 105° C. there is liable to be some loss of alkaloids. Weight of dry bark is about one-third that of fresh bark. Packing can be done in ordinary sacks without paper lining. To secure the best prices the bark of the roots should not be mixed with that of trunks and branches. That of the trunk and branches can be mixed if the quinine content does not fall below 5% or if no premium on content is expected.

1353. DELAHANTY, T. W., AND SCHUTRUMPF, E. D. 633.88.51
Quinine—after the war.
Plant. Chron., 1944, **39**: 114-8, reprinted from *Foreign Commerce Weekly* (no particulars).

The desirability of an international agreement on quinine production and distribution after the war is emphasized.

1354. DE SILVA, C. A. 633.912-1.55
Field experiments on Dartonfield Estate XX. Comparison of tapping systems (1942).
Quart. Circ. Ceylon Rubb. Res. Scheme, 1943, **20**: 3-9.

The fifth of a series of annual reviews on a tapping experiment with mature rubber seedlings in which 11 tapping systems are compared. The double three system, 2S/2, d/3, 133%, shows an increase of 26·5% over the control of 1942-3, and the 20% increase over a period of 6 years can be taken as a reliable indication of the yielding capacity of the system. So far the increased yields have not affected the trees and the method seems to be a satisfactory one for the increase of wartime output.

1355. WHELAN, L. A., AND DE SILVA, C. A. 633.912-1.8
Field experiments on Dartonfield Estate XXI. Manuring experiment with mature rubber (1942).
Quart. Circ. Ceylon Rubb. Res. Scheme, 1943, **20**: 10-1.

Evidence to date indicates that biennial manuring at double rates has not led to any loss of efficiency as regards nitrogen, but that possibly the double application of the NPK mixture has been followed by a drop in yield.

1356. WHELAN, L. A., AND DE SILVA, C. A. 633.912-1.8
Field experiments on Dartonfield Estate XXII. Measurements of growth in replanted areas (1943).
Quart. Circ. Ceylon Rubb. Res. Scheme, 1943, **20**: 11-4.

The area was replanted with budded stumps in 1938. The 1942 manures were applied in September at the following basic rates per tree, $N=P_2O_5=K_2O=5.5$ oz. Responses measured in June 1943 were not significant for N and K but highly significant for P. Phosphate alone should be applied to young areas where growth is satisfactory. Backward areas should receive a complete manure.

1357. O'B(RIEN), T. E. H., AND S(HARP), C. C. T. 633.912-2.181
Rainguards for rubber trees.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1943, **20**: 23-5.

A number of rainguards for the tapping panel were submitted by inventors but none has proved suitable. The most likely was a device involving the use of a talipot leaf for protecting the cut, but, though simple and effective, the value would depend entirely on the availability of materials. The requirements for a practical rainguard are—effectiveness in all weathers, cheapness, i.e. about 30 cents per tree per annum, and ability to be constructed of material easily available on a large scale. In addition it must not interfere with tapping or cause any slowing down of the tappers' work, nor must it interfere with bark renewal or with the normal physiological processes of the tree.

1358. RUBBER RESEARCH SCHEME (CEYLON). 633.912-1.541.5
Notes on budgrafting procedure.
Advis. Circ. Ceylon Rubb. Res. Scheme **1** (revised), 1943, pp. 6.

A description is given of the method of budgrafting rubber (*Hevea*) in Ceylon by the modified Forkert method. Budding is started soon after dawn and continues till 10 a.m. and again from 3 p.m. to sunset. In shaded nurseries it can continue all day. It is discontinued during periods of heavy rain or after 7 days without rain. The stock stem should measure 1-2 inches in diameter at ground level corresponding to an age of 12-24 months. Fertilizer may be applied 3 months before budding but not later. A suitable mixture for backward seedlings is 1 oz. per plant of sulphate of ammonia 100, Saphos phosphate 100, muriate of potash 15. The best budwood is 12-18 months old, bright brown, easy peeling and 1-2 inches in diameter. Buds above the scar of normally developed foliage leaves or rudimentary scale leaves are used, the latter being the most easy to remove. Three methods of removing the bud are described, that preferred by the Research Scheme being performed with a special cutting tool. It is important to clean the stock with a cloth before opening the flap, to avoid touching the cambium of stock or patch with the hand, to ascertain that the core of the bud has not been left in the wood, to avoid rubbing the bud patch over the cambium

of the stock, and, after cutting back the stock 3 or more weeks from budding, to remove all shoots from the stock, otherwise the bud will not shoot. Plants budded in the field should be shaded with a basket or by a growth of cover plants.

1359. (White, A., and Imle, E. P.) 633.912-1.541.5
Hevea budgrafting improved.
Agric. Amer., 1944, **4**: 62.

Budwood cut from *Hevea* at the end of a rest period, i.e. just before one of the usual growth flushes, gives a 50% better take than that taken in the active period if there is any delay between cutting and use, such as transporting from one locality to another. Girdling the young *Hevea* plant 9 to 14 days before cutting the budwood also increased the percentage of budding successes.

1360. Rubber Research Scheme (Ceylon). 633.912-1.537
Notes on rubber seedling nurseries.
Advis. Circ. Ceylon Rubb. Res. Scheme **3** (revised), 1943, pp. 5.

The best planting system in the nursery is to space the rows alternately 1 ft. and 2 ft. apart, and to plant the seed at 6-inch intervals. The 2-ft. passage allows room for budding. Instructions are given for the preparation of beds on flat and on sloping ground. Fresh seed, picked over, and germinated in special beds before planting, is advised. The construction of these beds is described. Seeds that have not germinated in 14 days should be discarded. Germinating seeds are transferred to the seedling beds as soon as the tip of the rootlet has forced its way through the seed coat. Germinated seeds are planted in a horizontal position with the flat sides downwards. Weeds must be removed by hand without scrapers. Five tons per acre of cowdung or compost plus 100 lb. of rock phosphate can be incorporated in the top foot of soil when the beds are made up. At 6 months wartime standard rubber fertilizer "B" can be given (ammonia 100, Saphos phosphate 100, muriate of potash 15) if growth is backward. Manure should not be given within 3 months of budding. Treatment of the more important pests and diseases is described. An acre will hold 30,000 seedlings, which should be reduced to half that number before budding time by judicious thinning of weaklings. An alternative layout and planting method is given for a nursery from which plants are to be transferred to the field as stumped buddings or where the nursery is on a hard subsoil. It consists essentially in the formation of planting holes, 8 in. wide and 2 ft. deep and spaced 18 in. apart on a quincunx, filling with good top soil and inserting 3 germinated seeds in each hole at the corners of a 4-in. triangle, the two weaker plants being thinned out before budding.

1361. Rubber Research Scheme (Ceylon). 633.912-1.459
Contour lining, holing and filling, cutting of platforms and drains.
Advis. Circ. Ceylon Rubb. Res. Scheme **4** (revised), 1943, pp. 5.

Earthwork methods adopted against erosion in hillside rubber plantations in Ceylon are (*a*) contour platforms, (*b*) contour trenches, (*c*) silt-pitted drains. Experiment has shown that young budded rubber does equally well on land opened on any of the 3 methods. Silt-pitted drains are the cheapest to construct and gave satisfactory control of water movement. Instructions and diagrams are given for the making of these three works.

1362. Rubber Research Scheme (Ceylon). 633.912-1.541.5
Planting and after-care of budded stumps and stumped buddings.
Advis. Circ. Ceylon Rubb. Res. Scheme **8** (revised), 1943, pp. 4.

Transplanting. Planting should only be undertaken when wet weather is expected. The ideal stump for transplanting should be of 1½-2 in. diameter at ground level and 15 to 24 months old. Survival is largely determined by the care taken in uprooting. The soil is first loosened with a fork or alavango [apparently a kind of pointed crowbar] about 1 ft. from the row and then scooped out from around each plant without damaging the roots. Side roots should not be cut within 6 in. of the tap root. The stump is then pulled out by an upward lift which may require 3 men if the tap root is well developed. The tap root should not be cut or broken. The plant is then stumped 4 in. above the bud patch; the cut is made at an angle of 45° sloping away from the bud and is at once dipped in melted grafting wax. The stump is then planted in a previously prepared hole. The loose earth is taken out of this sufficiently to allow the side roots to enter, and the bottom of the hole is deepened with the alavango to take the taproot. The stump should be oriented so that the bud faces north (in Ceylon). The bottom of the bud patch should be 1 in. above ground level. In refilling the earth is packed firmly round the tap root and the remainder of the soil replaced in layers of 6 to 8 inches, each layer being firmed with the feet while the stump is held in position. Careless filling of the holes causes much loss. The admixture of 4 oz. of rock phosphate with the earth while filling is recommended. The holes are filled well up to ground level to prevent surface water accumulating. *After care.* Watering at 3 day intervals is necessary in dry weather. The bud shoot, which may sprout within 3 weeks, must be trained to a single stem to a height of at least 7 ft. The protective baskets, which are often inverted over newly planted buddings, must be removed, if there is persistent wet weather between sprouting and the maturation of the first leaf whorl, to avoid the risk of *Phytophthora palmivora* attack. In larger stocks the stock snag should be cut off when the shoot has grown 18 in. of brown wood. In small stocks up to 1½ in. diameter the snag can be left to decay without removal. The cut surface may be left untreated if of not more than 2 in. in diameter. Callusing will be rapid if the stock is shaded adequately. The procedure for planting stumped buddings is much the same. They should be stumped in brown wood at a height of 8 ft. midway between two nodes. They will have attained a girth of 6 in. and be 2 years old from budding. After transplanting all upper shoots are allowed to grow till the tree is established. The number is then thinned to 3 well-spaced shoots. If the upper part of the stem dies and shoots develop below 6 feet, only one should be finally retained.

1363. Rubber Research Scheme (Ceylon). 633.912-2.4
Root disease in replanted areas.
Suppl. to Advis. Circ. Ceylon Rubber Res. Scheme **10**, 1943, pp. 2.

Manioc [cassava] (*Manihot utilissima*) planted among rubber is a useful indicator of root disease (*Fomes lignosus*) but has the disadvantage that the leaves do not necessarily wilt when the roots are attacked. It is, therefore, extremely important when harvesting manioc to inspect each clump for the presence of *Fomes* mycelium. If an infected area is discovered it should be thoroughly dug over to discover the sources and limits of the disease. Digging must continue till healthy plants are reached. All roots and plant debris from the infected area must be removed and burnt. The disease patches should be marked and the manioc plants on the boundaries dug up and examined a month later. The root system of all rubber trees in the vicinity should be examined. All old manioc stems near the disease patches should be collected and burnt. Manioc or other indicator plants, e.g. *Crotalaria anagyroides*, should be replanted in infected areas a month or two later to discover where the disease is still active.

1364. Williams, R. O. 633.913
Rubber production.
Proc. agric. Soc. Trin. Tob., 1943, **43**: 257-9, 261, 263, 265, 267.

Growers of any kind of rubber in Trinidad and Tobago are

exhorted to get the most out of their trees. Information is provided on the best method of tapping *Castilloa*. In present circumstances the production of scrap rubber is advised. The loose bark and debris are scraped from the tree, the ground at the foot of the tree is also cleaned of weeds and covered with some large leaves such as banana, laid down as a mat. One side of the tree is then slashed with a cutlass at intervals of 1 ft. to a height of 16 ft. from the ground, the second half of the tree being similarly treated when the first cuts have healed. The cuts should be oblique and made from below upwards so that the gaping edge forms some protection against rain lodging in the cup. Tapping is only done 2 or 3 times a year. The coagulated rubber is left from 2 to 5 days and adhering debris is cleaned off, but the free latex may be collected with the aid of a spoon and bucket at the time of tapping. The rubber after collection is allowed to air for a few weeks in a covered shed.

1365. RICHARDS, A. V. 634.441-1.541.11
Stock-scion trials with mango I. A preliminary note.
Trop. Agriculturist, 1943, **99**: 134-9, bibl. 2.

An experiment was laid down in November, 1937, at the Experiment Station, Pelwehera, Ceylon, to test the relative merits of 4 mangoes, Wal amba (sour mango), Kohu amba (fibre mango), Etamba (wild mango) and Betti amba (Bombay mango) as rootstocks for 4 scion varieties, the Jaffna mango, the most popular variety in Ceylon, Ambalavi, a dry zone variety for calcareous soils, Willard, introduced from Mauritius, and Sabre from South Africa. The design of the experiment was a 4×4 complex Latin square with split plots in which the 4 scion varieties were distributed at random over the main plots and the 4 stock varieties over the sub-plots, there being 12 plants per main plot and 3 plants per sub-plot at a spacing of 32 ft. by 30 ft. The total number of plants, excluding the single border row round the entire experimental area, was 192. The stocks were planted in the field from bamboo pots when a month old; there were many losses especially with Etamba, and a uniform stand was never obtained. The stocks were not budded for 3 years, by which time many were overgrown and had to be budded repeatedly by inserting the buds (modified Forkert system) into the branches of the framework near their points of union with the main stem. The successfully budded branches were ring barked 6 inches above the union and later removed. One branch was left unbudded as a temporary nurse branch. Sour mango stock is monoembryonic and therefore variable. It has numerous laterals and transplants well. Fibre mango is polyembryonic and shows little variability, for the sexual embryo is almost always smothered by the asexual seedlings. Each seed, however, rarely produces more than one strong embryo worth selecting. The roots are many and fibrous and the plant transplants well. Bombay mango is also polyembryonic and comes true to type. It grows vigorously and transplants well. Etamba is monoembryonic and therefore variable, is more easily budded because of its thinner bark, but takes 2 years instead of 1 to reach budding size, and having only a long tap root and very few laterals is difficult to transplant. It makes immense trees but should be raised in the field. The stocks are fully described, as are the scion varieties. Willard grew well on all stocks and fruited 2 years after budding. Stock influence did not affect quality, though fruit on Etamba was numerous and small. Two specimens of Jaffna on Etamba and one on Betti amba fruited 2½ years after budding, while only one Sabre, on Betti amba, has yet produced anything.

1366. VANDERWEYEN, R. 634.6
Quelques directives pour l'établissement d'une palmeraie. **(Establishing an oil palm plantation.)**
Bull. Agric. Congo belge, 1943, **34**: 80-108, bibl. 9.

Seed germination. Germination of the variety *tenera* takes about a year in the open ground with a success percentage of 30%-50%. A full description is given of a method of germinating the seeds in boxes holding 5,000, plunged in a frame hotbed constructed to hold 6 boxes and maintaining a temperature of not more than 42° C. Germination percentage can be thus raised to 75% and the time taken reduced to 3 months. *Seedling nurseries.* As soon as the tigellum, still hooded by the operculum, appears in the form of a small white spot, the seedling is removed from the box and planted in a seed bed. After germination has begun the boxes must be inspected every 3 days as any delay increases the risk of breaking the developing cone. Germinated seeds must be watered and shaded immediately on removal. Even a quarter of an hour's exposure to direct sunlight will destroy them. The seeds are now pricked out 4 cm. apart and 1 cm. deep in sandy soil. If development has reached the stage when radicle and hypocotyl have made their appearance the seed should be set so that these projections, which form right angles with the tigellum, are horizontal to the soil. If, however, radicle and hypocotyl are advanced enough to be distinguished apart, which should not occur with proper surveillance, they should be planted with due regard to their polarity. At the two-leaf stage the young plants with the nut still attached are again transplanted and this is the best stage for distribution to growers' nurseries where they will remain until final planting. Due precautions are taken against desiccation *en route*. Instead of ground planting nursery trees may be grown on in baskets, the method being useful only when small quantities are in question. When 12-13 months old the palms may be planted in the field. They then measure about 7 cm. diameter at the collar. Trimming on transplanting consists of total removal of the dead leaves, cutting back the recurved green leaves to the first leaflet and the upright leaves to half their length. Advice is given on clearing the ground, preparation of planting holes, etc., in great detail. Close attention is given to spacing and appropriate distances are recommended according to soil type, rainfall and variety of oil palm. Bare-root planting is rejected as giving a mortality of 10% to 20%, delaying growth and reducing individual yield. Tables are given to support this. The loss in yield from bare-root planting in an experimental plantation after the first 4 years amounted to 150 tons of oil per 100 hectare. Notes are given on the pests peculiar to each stage in the life of the young palm.

1367. ANON. 634.662-1.541.44
Some aspects of heading-back and topworking fruit trees.
Bull. U.P. Dep. Agric., Fruit Ser. **15**, 1943, pp. 5, 1 anna, being *Leafls. Punjab Dep. Agric.* **41** and **95**.

The high percentage of deaths in their first season of young trees in the Punjab is stated to be mainly due to not cutting back the top at the time of planting. The second of the Punjab leaflets suggests that it is desirable to extend the cultivation of ber trees (*Zizyphus jujuba*) in the Province, since the fruits would be marketable during the slack season from the end of January to the middle of April. The propagation of ber trees by budding and the topworking of wild ber trees is described. In the latter case it has proved beneficial to ring the bark of the trunk or branch immediately above the point where the scion bud is inserted.

1368. SUMMERVILLE, W. A. T. 634.771-1.8
Studies on nutrition as qualified by development in *Musa cavendishii* Lambert.
Qd J. agric. Sci., 1944, **1**: 1-27, bibl. 80.

The purpose of this study was to prepare a firm basis on which to make manurial recommendations. A study of growth showed that leaf production reflected growth quantitatively and could therefore, within limits, be used to measure nutritional effects. Climatic factors were found largely to govern the number of leaves produced in a given period, but the area of leaf produced was found to be an index of nutritional effects. Differences in size of plants

were due to differences in nutrition in the very early stages of growth, but after the production of a comparatively small area of leaf all plants increased at the same relative rate over the rest of their growing period. It was found possible to use the time of initiation of floral parts in studying the development of the plant. This development proceeds in 3 stages: (1) purely vegetative increase, (2) production of both vegetative and floral parts and (3) the maturation of the fruit. The first part of the first stage is a formative period and it was found that on the question of nutrition the plants will yield as much information within 3 months from planting as during their whole life. Certain climatic factors were found to be important in determining both rate of development and number of fruits. The age of the plants also affects the number of fruits, but it was not found possible to correlate nutritional factors with size of fruit. The effect of climate proved so great that it would appear essential to assess this before trying to assess the effects of such other factors as fertilizers. In this connexion it may be noted that the addition of an element needed by the plant may possibly lead to a reduction in yield, since it may cause the plant to develop its fruit in an adverse season. This stresses the need for planting at the appropriate time. Although added potash was associated with accelerated development in the experimental work related and there were no quantitative effects of N or P, definite conclusions cannot be drawn from these facts. The paper is well illustrated and adequately provided with graphs and tables.

1369. MORGAN, C. N. 635.62
The choko [*Sechium edule.]**
Qd agric. J., 1944, **58**: 27-32.

The cultivation is described of the choko, a herbaceous perennial creeper, popular in the coastal districts of Queensland. Two methods are suggested for the construction of the trellises, which have to last out the life of the plant.

1370. GOSSWEILER, J., AND MENDONÇA, F. A. 581.9(673)
Carta fitogeográfica de Angola, Memória descritiva dos principais tipos de vegetação da colónia, determinados pelos seus aspectos fisiográficos e carateres ecológicos segundo a nomenclatura de Rübel. **(A map of the plant geographical districts of Angola, Portuguese East Africa.)**
Issued by the Govt of Angola (undated), pp. 242 +large coloured folding map, from review *Chron. bot.*, 1943, 7. 434-5.

MILLER, C. D., AND LIND, H. Y. 612.3: 551.566.1
Food for health in Hawaii.
Bull. Hawaii agric. Exp. Stat. **88**, 1942, pp. 84, 0.50 $.

MORSTATT, H. 632.3/8
Krankheiten und tierische Schädlinge der Nutzpflanzen Afrikas. **(Diseases and pests of economic plants in Africa.)**
Reprint from "*Afrika*", Vol. **8**, de Gruyter & Co., Berlin, 1942, pp. 147, from review *Zbl. Bakt.*, 1943, **106**: 202-3.

HÜBBENET, E. R. 633.74: 581.45
Zur Frage über die Entwicklung des Blattes von *Theobroma cacao*. **(Leaf development in the cacao tree.)**
C.R. Acad. Sci. U.R.S.S., 1941, **30**: 751-3, bibl. 6.

PADDOCK, E. F. 633.912: 575.17
On the number of chromosomes in *Hevea*.
Chron. bot., 1943, 7: 412-3, bibl. 4, being *Contr. Dep. Bot. Ohio St. Univ.* **463**.

SIDERIS, C. P., AND YOUNG, H. Y. 634.774: 581.192
Effects of iron on chlorophyllous pigments, ascorbic acid, acidity and carbohydrates of *Ananas comosus* (L) Merr., supplied with nitrate or ammonium salts.
Plant Physiol., 1944, **19**: 52-75, bibl. 14.

DAS GUPTA, S. N., AND ASTHANA, S. N. 634.441: 581.192
Histopathology of necrotic mango fruit.
Curr. Sci., 1944, **13**: 77, bibl. 1.

* Alias choco, chucu, cayote, chayote, christophine, etc

STORAGE.

1371. GREGORY, J. H. 634.8-1.564
Packing grapes for market.
Qd agric. J., 1944, **58**: 82-8.

The instructions, covering all operations connected with the marketing of grapes, including harvesting, are supplemented by a number of photos.

1372. GREGORY, J. H. 634.22: 658.8
Marketing plums.
Qd agric. J., 1944, **58**: 20-6.

In these instructions on the marketing of plums in Queensland emphasis is laid on packing, although such subjects as maturity, harvesting, transit troubles, etc., are also dealt with. Tables give the number of plums contained in the dump half-bushel according to variety, size and method of packing used, the packing being illustrated by means of photos.

1373. MICKLEM, T., DU PREEZ, D., AND BLACK, M. W. 634.13-1.564
Pear packing experiments.
Fmg S. Afr., 1944, **19**: 45-53, bibl. 5.

Experiments conducted at the Western Province Fruit Research Institute, Stellenbosch, with the object of developing cheaper methods of packing pears for local markets in South Africa and of standardizing such methods, led to a number of definite recommendations. The chief data obtained on standardized packs and counts, grading, shrinkage and ripening are presented in tables and photos show low and high net-weight packs in different views. The Williams variety was used throughout the trials.

1374. MICKLEM, T., DU PREEZ, D., AND BLACK, M. W. 634.22-1.564
Plum packing experiments during the 1942-43 season.
Fmg S. Afr., 1943, **18**: 857-66, bibl. 3.

The problem of evolving a standard range of packs and containers suitable for marketing plums in the Union of South Africa, was studied at the Western Province Fruit Research Institute, Stellenbosch. Although the investigations cannot be regarded as completed the results obtained so far allowed the authors to make recommendations on the following points: Use of wrappers, cover sheets, packing style, containers, liners and padding material, tightness of pack, grading, handling, shrinkage, skin crack, standardized packs and counts. The chief data are tabulated and different methods of packing are illustrated.

1375. MICKLEM, T., DU PREEZ, D., AND BLACK, M. W. 634.25-1.564
Peach packing experiments conducted during the 1942-43 season.
Fmg S. Afr., 1943, **18**: 873-9.

It was the aim of this investigation, conducted at the Western

Province Fruit Research Institute, to determine experimentally the most suitable methods of packing peaches for marketing in South Africa. Detailed trials led to the recommendation: (1) of two packing methods: the seminest unwrapped single layer or the solid wrapped single layer, the trade being in favour of the solid pack for reasons of space economy; (2) of the standardization of packs; (3) of the enforcement of careful handling of the fruit in transit and on markets. Six packing methods are illustrated.

1376. FISHER, D. V., BRITTON, J. E., AND O'REILLY, H. J. 634.25+664.85.037
Peach harvesting and storage investigations.
Sci. Agric., 1943, **24**: 1-16, bibl. 15.

The experiments detailed here were necessitated by the rapid expansion of peach growing in the Okanagan Valley of British Columbia, where production of peaches rose more than fourfold between 1933 and 1942. Seven varieties of yellow-fleshed peach were used and the work extended over a 2-year period. Among the authors' more important findings are the following: 1. Shades of colour of mature and immature peaches were determined according to Ridgway's Colour Chart. There was a close similarity between skin and flesh colour in any given variety. 2. Mature peaches in ideal shipping condition showed a firmness of 14 to 18 lb. with a $\frac{5}{16}$ in. and 20 to 25 lb. with a $\frac{7}{16}$ in. pressure tester point. 3. Differences in soluble solids content of mature and immature peaches were too small to allow of this being used as a test of value as a maturity index. 4. When picked mature, suitable for fresh shipment, and held at 65° F. peaches remained in good condition for the following days: Golden Jubilee 8, Rochester 11, Vedette 11, Valiant and Veteran 13, J. H. Hale 33, Elberta 26. 5. Picking slightly less mature lengthened life by a few days but only at the expense of quality. 6. When stored at 32° F. immediately after picking different varieties varied in the length of time they remained free from breakdown. 7. Softening the fruit after picking to a firmness of 10 lb. as measured by the $\frac{7}{16}$ in. pressure tester appeared to be the optimum amount of pre-ripening necessary to produce a substantial increase in breakdown-free storage life without rendering the fruit too soft for commerce. 8. The optimum period of pre-ripening varied somewhat with varieties. 9. Pre-ripening did not appreciably reduce the life of the fruit after removal from cold store as compared with no pre-ripening. 9. Delayed cold storage pre-ripening treatment reduced astringency and improved texture and quality of fruit. 10. The rate of softening during storage at 32° F. varied, being less with Hale and Elberta than with Rochester and Vedette. 11. A temperature of 32° F. greatly retarded the rate of soluble pectin formation—which was correlated with rate of fruit softening—due to hydrolysation of protopectin. 12. Respiration rates at 32° F. were very much lower, approximately 4 c.c. CO_2 per kg. fruit per hour, than those of fruit held at 60°-80° F., namely 47 c.c. Pre-ripening prior to storing at 32° F. did not affect this. Immature and mature peaches respired at similar rates. Storage of Rochester and J. H. Hale in atmospheres containing 7% and 9% of CO_2 at 32° F. did not lengthen storage life and in Rochester resulted in skin injury. These were the only varieties submitted to CO_2 storage.

1377. BAKER, C. E. 634.11-1.564
Cold storage tests on corrugated paper apple boxes.
News Lett. Ill. St. hort. Soc. **8**, 1943, pp. 3-4.

Apple packing boxes made of the newly developed weather-proofed corrugated board known as Victory board stood up to severe treatment in Illinois. The packages were stored at 33°-35° F. with relative humidity 83%-86%. Packages were sprayed with water on all exposed surfaces at least 8 times during the season, were stood in floor water for several weeks, stood out for some hours in warm rain and packed with semi-rotten apples. In no case did the paper lose its rigidity or strength. The bottom boxes of a pile 7 or 8 high after 17 weeks were still unaltered. Such pressure is much more than they would be called upon to bear in actual practice.

1378. TINDALE, G. B. 664.85.11.035.1+664.85.11.038
Cool storage of apples. Gas storage and skin coating experiments.
J. Dep. Agric. Vict., 1944, **42**: 124-9.

Gas storage and skin coating experiments with a number of locally grown apple varieties were conducted in Victoria, Australia, preliminary to introducing these methods on a commercial scale. It was found that the two treatments increased the storage life of all varieties tested by about 50% and 25% respectively. Granny Smith and Democrat proved particularly suitable for storage in gas, an atmosphere of 5% CO_2 giving the best results. Also Jonathan and Rome Beauty suffered practically no damage from any disorder during gas storage, whereas Delicious and Stewart's Seedling developed breakdown to a considerable extent, the former superficial scald also. Skin coating in various solutions gave satisfactory control of soft scald and breakdown in ordinary cool storage, if the following temperatures were maintained: (1) for Rome Beauty, Stewart's Seedling and Granny Smith 32° F. continuously, (2) for Jonathan and Delicious 40° F. until the end of April, 36° F. during May and 32° F. thereafter. It is suggested that for marketing during the last months of the year 20% of the crop should be gas-stored and that the keeping quality of a large proportion of the remainder should be improved by skin coating.

1379. MILLER, T. C. 664.85.11.038
Apple storage experiments. Effect of skin coatings.
J. Dep. Agric. W. Aust., 1943, **20**: 334-7.

In the experiments described from W. Australia 1,500 loose cases of Granny Smith apples were coated by dipping in a four in one mixture of castor oil and dewaxed shellac made up into a 10% solution with 95% alcohol. The solution drained freely from the dipped fruits, which were dry in about an hour. The thin coating of oil and shellac which remained on each apple was scarcely noticeable either to sight or taste. The fruit was dipped in open slatted white wood picking boxes, the transference from the field boxes being carried out by a careful and expeditious method which is described. The maximum useful storage period was 3 months. At the end of this period fruit dipped when over-mature for processing developed breakdown and browning of the tissues with a flavour typical of fruit starting to break down. Fruit dipped at the optimum stage of maturity showed no breakdown even though yellow; there was no off flavour, but the characteristic flavour of the variety had disappeared. Of fruit green at the time of processing, some developed a grassy taste, and others distinct alcoholic flavours. The fruit was picked over, packed and marketed. The appearance was good and there were no comments by purchasers on taste or breakdown.

1380. FISHER, D. V. 664.85.035.1
Controlled atmosphere storage helps to keep fruits fresh.
Reprinted from *Food Industries*, May 1943, pp. 4, bibl. 25.

The author notes that different kinds of fruit are stored most successfully in different gas mixtures at different temperatures. He quotes optima experimentally determined for the apple varieties McIntosh, Delicious, Jonathan and Yellow Newtown, as also for Bartlett pears. So far gas storage of stone fruits has not proved economic and work with citrus is still in its initial stages.

1381. PASTORIZA, R. 664.85.25.037+664.85.22.037
Tres años de ensayos de conservación frigorífica de duraznos y ciruelas. (Segunda serie.) **(Three years of experiments in cold storage of peaches and plums.** (Second series.*).)
Bol. Frut. Hort. B. Aires, 1942, Vol. 7, No. 86, pp. 45, bibl. 8.

This bulletin contains further reports of experiments carried out in Argentina from 1939 to 1942 on the cold storage of peaches and plums. Records are given of the behaviour under various conditions of storage of 9 peach varieties, 6 nectarines, and 2 gages.

1382. MENENDEZ LEES, P., BERGERET, G., AND ETCHANDY, A. M. 664.85.3.037
Observaciones sobre frutas citricas de la region de San Antonio, Dep. del Salto, de la cosecha de 1940 y 1942 conservadas en cámara frigorífica. **(Citrus fruit storage from 1940 and 1942 harvests at the Uruguay cold storage experiment station.)**
Reprinted from *Rev. Fac. Agron. Montevideo*, 1943, No. 34, pp. 35, bibl. 24.

Observations were made on the keeping qualities in cold storage of a number of orange and mandarin varieties, and the results, which include analyses of the fruit at several periods during storage, are recorded.

1383. HUELIN, F. E. 664.85.3
The handling and storage of Australian oranges, mandarins and grapefruit.
Bull. Coun. sci. indust. Res. Aust. **154**, 1942, pp. 60, bibl. 13.

This is a report of investigations which took place between 1935 and 1941 on the storage of Washington Navel, Valencia, Joppa, Parramatta and Siletta oranges, Emperor mandarins and Marsh Seedless grapefruit with particular emphasis on Navel and Valencia oranges. The various forms of deterioration are described in detail. Keeping quality was found to depend largely on environment and treatment prior to picking. As regards date of picking, if rots predominate the earlier picked fruit usually keeps best, if storage spot is greater the reverse may hold good. Sweating for 7 days before packing generally reduces the development of storage spot and in any case reduces the risk of mechanical injury, slack packs and rind blemish. The most effective wraps are liable to taint the fruit; others do not reduce wastage. It is noted that, in carefully handled fruit free from stem end rot and other infections at picking, storage spot and total wastage have generally been less after long storage at 50° F. than at lower temperatures. If ventilation is restricted and CO_2 accumulates to 5% or more, stored oranges are liable to develop an off flavour. Changes in colour, respiration, acidity and alcohol content of orange juice during storage are discussed. *Penicillium* rots are reduced by clipping oranges and mandarins. Wilting, increased by alkaline detergents and borax, is considerably reduced by waxing, the application being by dipping or spraying. The control of wastage and factors involved in storage spot are discussed. Various practical recommendations applicable primarily to local conditions are made.

1384. MENENDEZ LEES, P. 664.84.037+664.85.037
Relación de algunas investigaciones frigoríficas realizadas en el curso del año 1942 sobre conservación de productos de origen vegetal. **(Research on cold storage of plant products in 1942.)**
Reprinted from *Rev. Asoc. Ing. agron. Montevideo*, 1943, No. 2, pp. 6, bibl. 8.

A summary of results published during 1942 of cold storage experiments in various countries. The subjects covered are storage of dried fruits and vegetables (U.S.A.); storage of apples in controlled atmospheres (Summerland Experiment Station, B.C.); experiments on the cold storage of apples (Argentina); influence of temperature during ripening on commercial quality of Bartlett pears (California); three years of experiments on the cold storage of peaches and plums (Argentina); cold storage of potatoes (India); the desiccation in storage of products preserved by freezing (U.S.A.).

1385. MENENDEZ LEES, P., BERGERET, G., AND ETCHANDY, A. M. 664.8.037(899)
Temperaturas de congelación en frutas del Uruguay. **(Freezing temperatures of fruit in Uruguay.)** [English summary 10 l.]
Reprinted from *Rev. Asoc. Ing. agron. Montevideo*, 1943, No. 3, pp. 8, bibl. 18.

As a result of investigations carried out on 10,000 Uruguay fruits since 1934 the freezing point has been determined for a large number of varieties of plums, peaches, apples, pears and citrus. It is hoped that the information will prove useful in enabling the local cold storage plants to improve their performances.

1386. PLANK, R. 664.85: 632.19
Zur Theorie der Kaltlagerkrankheiten von Früchten. **(The theory of cold storage troubles of fruits.)**
Planta, 1941, **32**: 364-90, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. p. 64.

The author's statistical calculations are based on observations in respect of cold storage troubles made by Rees Davies in South Africa. It is claimed in conclusion that the knowledge of certain temperature factors and their influence on the metabolism of the fruit would enable us to determine in advance the behaviour of every fruit towards cold storage troubles.

1387. BENCE PIERES, R. 634.334: 547.314.2
La coloración artificial del limón. **(Artificial colouring of lemons.)**
Alm. Minist. Agr. B. Aires, 1944, **19**: 257-8.

The Estación Experimental de Concordia, Argentina, has been experimenting successfully with the artificial colouring of lemons by means of acetylene gas, pure ethylene being expensive and difficult to obtain. The gas is generated in an ordinary acetylene lamp. The dose of calcium carbide necessary to colour green lemons in 4 to 5 days at a temperature of 18° to 20° C. with a relative humidity of 75% is 4 g. per cu. m. of the gas chamber. The chamber should be ventilated for 2 hours daily. No loss of quality has been observed.

1388. BARNELL, H. R. 664.85.771
Studies in tropical fruits. XI. Carbohydrate metabolism of the banana fruit during ripening under tropical conditions. XIII. Carbohydrate metabolism of the banana fruit during storage at 53° F. and ripening at 68° F. XIV. Carbohydrate metabolism of the banana fruit during storage at 53° F.
Reprinted under one cover by the I.C.T.A. Trinidad in 1943 from *Ann. Bot. Lond.*, 1941, **5**: 217-47, bibl. 11, *ibidem*, **5**: 607-46, bibl. 38 and *ibidem*, 1943, **7**: 1-22, bibl. 10.

Studies XIII and XIV were very briefly abstracted in *H.A.*, 12: 281 and 13: 629 respectively. Study XI describes the changes undergone during the ripening of detached bunches of a commercial grade of banana held at tropical temperatures. The need for quick cooling after cutting is clearly shown by the rapid chemical changes which occur in the fruit during the first few hours under tropical conditions.

1389. BARNELL, H. R. 664.85.771
Studies in tropical fruits. XV. Hemicellulose metabolism of the banana fruit during storage and ripening.
Ann. Bot. Lond., 1944, **7**: 297-323, bibl. 24.

The changes in the amounts of hemicellulose and cellulose

* Series **1**, *ibidem*, 1942, Vol. 6, No. 48; *H.A.*, 14: 909.

in the pulps and skins of two commercial grades of Gros Michel bananas have been observed at the Low Temperature Research Station, Trinidad, during long or short storage at 53° F. followed by ripening at 68° F. and also for one grade, during continuous storage at 53° F.

1390. Anon. 664.84.037
Test for adequacy of blanching in frozen vegetables.
Fruit Prod. J., 1944, **23**: 238.
The test described in this information sheet from the Western Regional Research Laboratory, Albany, Calif., is based upon the determination of peroxidase activity, which showed good correlation with the keeping quality of certain frozen vegetables held in freezing storage for a period of 4 years.

1391. Burkhardt, G. J. 664.84.22
Principles of sweet potato storage house design and management.
Trans. Peninsula hort. Soc. 1943, 1944, pp. 63-74, bibl. 4.
An account of experiments in storage of sweet potatoes in which heat and humidity were regulated. The engineering problems are considered in some detail.

1392. Solomon, M. E. 664.8: 632.654.2
Tyroglyphid mites in stored products. I. A survey of published information.
Publ. (out of series) *Dep. sci. industr. Res., Lond.*, 1943, pp. 36, bibl. 227, 9d.
Among mites noted as attacking dried fruits are *Carpoglyphus lactis, Glycophagus domesticus, Tyroglyphus farinae*. A statement of Ong is noted to the effect that dried fruits can be protected from *Carpoglyphus* by keeping them at a temperature between —12·2 and 2·2° C. Zacher's statement is quoted that mites remove the etherial oils from tobacco and so detract from its quality. Tubers and bulbs have their share of mites and they are briefly noted here. Control measures have usually been heat treatment. Dipping in water at 50° C. has been found effective. Among other stored products an infestation of walnuts by *T. farinae* and of stored lemons by *T. americanus* are recorded. Among preventive measures can be counted the maintenance of dry conditions, the exclusion of rodents, birds and insects, general hygiene of stores, exclusion of infested material. In case of infestation the following methods of control are discussed: biological control, sifting, mechanical destruction, drying, cool storage and freezing, application of non-poisonous dusts, use of high frequency currents, hermetical sealing, fumigation with a wide choice of materials, spraying, washing and scrubbing.

FOOD VALUES AND PROCESSING.

1393. Division of Food Preservation, C.S.I.R., Australia. 612.3: 634.1/7: 551.566.1
The nutritive value of tropical fruits in Australia.
Food Pres. Quart. Aust., 1943, **3**: 45-50, bibl. 9.
A table shows the composition from a nutritive point of view of the principal tropical fruits grown in Australia and for apple, pear and orange. *Avocado*. Fuerte has an oil content of 26%, though other varieties may contain as little as 8%. It has a higher protein content than other fruits but is very low in sugar (0·5% when mature). It is rich in minerals, especially copper. The carotene content is high, the ascorbic acid content is 25 mg. per 100 g. or eqaul to that of the tomato. With calories 265 per 100 g. it is a valuable energy food. *Banana*. Calories 100 per 100 g.; is particularly rich in sugar and phosphorus, and is satisfactory as regards carotene and vitamin C. *Banana Passion Fruit* is rich in vitamin C. *Custard Apple* is low in vitamin C yet contains twice as much as apples or apricots. *Guava* is very rich in vitamin C, containing from 100 to 500 mg. per 100 g. according to variety, the pink-fleshed types containing the most. Various preparations of guava containing very high quantities of vitamin C have been used in the field during the war. *Jujube* in its high available carbohydrate content, 32%, rivals the date. There are no data on vitamin content. *Mango* is very rich in carotene and vitamin C, and has a high sugar content, but is lower in minerals than other tropical fruit. *Passion Fruit*, especially the skin, is rich in vitamin C, 110 mg. per 100 g. The pulp contains about 25%. A concentrate prepared from the skins and containing 110 mg. per 100 g. of vitamin C was not palatable. *Papaw* is as rich in carotene as apricot and richer than orange in vitamin C. The latex contains papain, an enzyme active in the digestion of protein. The vitamin C content is 30 mg. per 100 g. *Pineapple* has 10% to 15% of sugar but is less rich in carotene and vitamin C than most tropical fruits, though by no means deficient in these or in vitamin B. The juice contains bromelin, a protein-digesting enzyme. Common Smooth Leaf Cayenne contains 15 mg. vitamin C per 100 g. Rough Leaf 47 mg. and Ripley Queen 47 mg. *Japanese Persimmon* is next of the drupe fruits to the date in nutritive value. It has a fairly high energy value, 90 calories per 100 g., is rich in sugar and vitamin C and very rich in carotene.

1394. Tuba, J., Hunter, G., and Kennedy, L. L. 577.16: 634.1/8
On sources of vitamin C. II. Alberta native fruits.
Canad. J. Res., 1944, **22**, Sec. C, pp. 33-7, bibl. 8.
This paper is a survey of the ascorbic acid content of native Alberta fruits. Some wild fruits that are not usually eaten have been included in the investigation. The values of vitamin C for the most widely occurring and most generally used wild fruits are: blueberries, 5 to 18 mg. %; chokecherries, 8 to 19 mg. %; high-bush cranberries, 8 to 51 mg. %; pin cherries, 8 to 45 mg. %; raspberries, 14 to 40 mg. %; and saskatoon berries, 5 to 38 mg. %. These afford a considerable source of ascorbic acid. [Authors' abstract.] In an addendum are given the ascorbic acid values for miscellaneous plant materials, including nettles, dandelions and green hazel nuts.

1395. Tolmačev, A. I. 581.192: 577.16
Scientific notes—A study of vitamin-bearing plants in the northern regions. [Russian.]
Sovetskaja Botanika, 1942, **6**: 48-50.
This is a short account of some plant species containing vitamin C which occur along the valleys of the rivers Vyčegda and Dvina (near Archangel). In addition to a few comparisons between *Rosa cinnamomea* and *R. acicularis*, the quantities of vitamin C contained in several other species are also given. Among those mentioned are currant species. It is suggested that red currants may prove to be richer in vitamin C than is commonly supposed, if the analysis of *Ribes hispidulum* be at all indicative of such a possibility. Some species of both *Rumex* and the *Umbelliferae* also contain fairly large amounts of vitamin C. The leaves, stems and inflorescences were analysed separately.

1396. Bausch, S. 635.937.34: 577.16
Vitamingehalt und Trocknung von Hagebutten. (**Vitamin content and drying of rose hips.**)
Pharmazeut. Ind., 1943, H.9, p. 157, from abstract *Dtsch. Heilpfl.*, 1944, **10**: 7.
Fresh rose hips were found to contain up to 9,000 mg. % vitamin C, of which 60-80% are lost in the ordinary commercial drying process. The retention of vitamin C during processing varied with species and varieties, some retaining 100%. *Rosa haematodes* (12,000 mg. %), *R. woodsii* and

R. schneezwerg (10,000 mg. % each) gave dried products with an ascorbic acid content of 10-12%. Vacuum drying did not cause any vitamin losses in *R. canina*. Drying *in vacuo* at temperatures of more than 90° C. proved harmful and only carefully dried hips retained their orange-red colour. Air-dried hips had lost 50% of their vitamin. Whole or pressed fruits were found to keep better and to retain the vitamin for a longer period than powdered hips.

1397. KOSTENKO, V. D. 577.16: 581.5
Content of vitamin C in cultivated and wild plants growing in high region of Pamir.
C.R. Acad. Sci. U.R.S.S., 1943, **38**: 42-3.

The author, giving the vitamin C content of a number of vegetable and wild plants growing at 3,860 m. above sea level in the Valley of Ak-Baital, East Pamir, notes that they compare very favourably with those of the same vegetables—especially leaf vegetables—growing at lower levels. Of the wild plants the *Rosa* sp. (fruit) rising to 4,020 mg. % are easily highest and of others *Somarum salessowii* with 522 mg. % and *Eurotia ceratoides* (the specimen analysed was of delayed growth and development) with 228 mg. % come next. Of cultivated plants wheat and barley grains are highest with 205 and 290 mg. % respectively, followed by a spinach variety 175 mg. % and Chinese cabbage 167 mg. %.

1398. SRINIVASAN, M. 577.16: 581.192
Vitamin C in plants. Indian gooseberry (*Phyllanthus emblica*).
Nature, **153**: 684, bibl. 11.

According to work carried out at the Biochemical Laboratory, Madras, in 1935, the fruit of the Indian gooseberry, *Phyllanthus emblica*, contains as much as 290-468 mg. % of vitamin C. Later workers in India have assessed the content even higher, namely as 540 mg. %, 720 mg. % in the fresh pulp and 921 mg. per 100 ml. of the juice. The fruit possesses a mechanism capable of protecting ascorbic acid from oxidation, so that the vitamin remains largely intact even in the dried fruit.

1399. SUTHERLAND, M. D. 577.16: 581.192
Vitamin C in plants. Nasturtium (*Tropaeoleum majus*).
Nature, 1944, **153**: 683.

The nasturtium, *Tropaeoleum majus*, the leaves of which can be used as a salad, is rich in vitamin C, the concentration ranging from 200-465 mg. in the leaves to 100-160 mg. per 100 g. in the stalks in samples tested at the Dominion Laboratory, Auckland, N.Z. Rapid enzymatic oxidation takes place, unless prevented by boiling. An extract for addition to infant diet can be prepared by adding nasturtium leaves to boiling water until no more can be immersed, boiling for a further 3 minutes and draining. This extract normally contains 150 mg. ascorbic acid per 100 ml. and remains fairly stable in sealed containers. The pungent taste of the fresh leaves is eliminated by the boiling.

1400. BAUMANN, E. J. 577.16: 581.192
Vitamin C in plants. *Iris germanica*
Nature, 1944, **153**: 683-4, bibl. 2.

At the Laboratory Division, Montefiore Hospital, New York, the leaves of *Iris germanica*, the common German iris of gardens, have been found to be richer in vitamin C than the leaves of most plants, even at the end of the season. The ascorbic acid content of young, fresh, undried leaves is 0·6% and that of the older leaves 0·3%. Separation of the vitamins from the gums and other substances present in press juice is easier than from any other source yet used.

1401. VILLELA, G. G. 577.16: 634.975
Vitamin C in the needles of some conifers.
Science, 1944, **99**: 125, bibl. 4.

The decoctions of needles from a number of conifers were tested for vitamin C at the Instituto Oswaldo Cruz, Rio de Janeiro. Although the values found were low (for instance 3·3 mg. per 100 ml. ascorbic acid and 1·3 mg. dehydroascorbic acid for *Podocarpus sellowii* and 2·3 and 1 mg. respectively for *Pinus excelsa*) it is suggested that pine tea might be a useful source of vitamin C in some countries.

1402. SCHNEIDER, E., AND LITZENDORFF, J. 635.976.3: 577.16
Über die Verwendung des roten Holunder (*Sambucus racemosa*) als Nahrungsmittel und Vitaminspender. **(The red-berried elder as a food and a source of vitamin.)**
Hippokrates, 1943, **14**: 536, from abstract *Dtsch. Heilpfl.*, 1943, **9**: 116.

The vitamin C content of *Sambucus racemosa* berries is given as 810-1045 mg. per kg. of dry matter. The fat content was also determined and found to be high. Experiments showed that the berries are not injurious, provided the seeds have been removed. The utilization of the red-berried elder as a food, a source of vitamin C and possibly also as a source of oil is suggested.

1403. BRÜHNE, F. 635.938.66: 577.16
Die Sanddornbeere als Vitaminträger. **(The sea buckthorn as a source of vitamin.)**
Dtsch. Heilpfl., 1943, **9**: 113-5, bibl. 4.

It has been discovered by Löhner of Munich that the berry of the sea buckthorn, *Hippophae rhamnoides*, is an exceptionally rich source of vitamin C. Slightly overripe berries were found to have the highest ascorbic acid content, which is given as 610-826 mg. %. It is tentatively suggested that the vitamin C content is higher in berries growing in the shade than in those exposed to the sun. In one instance the figure for the shade side was 711 mg. % compared with 532 mg. % for the sun side. Generally, however, the difference is stated to be less. Also the vitamin A content is reported to be superior to that of most other fruits. A concentrate of sweetened sea buckthorn berry juice, for instance, with a vitamin C content of 700 mg. % was shown to contain 180,000 units of vitamin A. The berries appear, therefore, to provide an ideal preparation for fortifying jams and other foods.

1404. ISAAC, W. E. 634.421. 577.16: 581.192
A comparison of the ascorbic acid content of the guava (*Psidium guajava*) determined as furfural and by indophenol titration.
Govt. Printer Union of S. Africa, Pretoria, 1942, pp. 4, bibl. 15.

Boyes and de Villiers, working at the Low Temperature Research Laboratory, Capetown, investigated the ascorbic acid content of the skin, flesh and centre of fresh guavas and the flesh of canned guavas by Roe's furfural method and by indophenol titration. The figures obtained, including those for fresh whole fruit, viz. 650 mg. per 100 g., are higher than those of previous analysts. The results of the two methods of analysis agreed adequately, which indicate that indophenol titration is a satisfactory method.

1405. MORGAN, A. F., AND OTHERS. 664.84.047: 577.16
Vitamin losses in commercially produced dehydrated vegetables, cabbage, potatoes, carrots and onions.
Fruit Prod. J., 1944, **23**: 207-11, 219, 221, bibl. 8.

Thirteen lots of fresh, blanched, and dehydrated potatoes, cabbage, carrots and onions were obtained on visits to nine California dehydration plants. The samples were assayed immediately by chemical and micro-biological methods for thiamine, riboflavin, ascorbic acid, niacin, pantothenic acid and carotene. Fresh and dehydrated samples after being cooked were compared as to palatability and water uptake. Losses of vitamins due to blanching and dehydration were calculated from the vitamin content on the dry basis. Thiamine was lost, 22% to 56%, partly in blanching

and partly in dehydration. Riboflavin present in only small amounts in these four vegetables showed no consistent losses in dehydration. Niacin appeared to be fully retained except in three cases, pantothenic acid was fully retained, but ascorbic acid disappeared to the extent of 16% to 83% in all but five cases. A sulphured dehydrated cabbage retained more than the similar unsulphured sample and one dehydrated potato retained nearly all its ascorbic acid while the other lost all. Carotene was determined in carrots only and was found to be retained in two samples and partly lost in three others, the loss occurring directly in dehydration. Average vitamin values for these freshly dehydrated vegetables are given. After storage for 4 months at 90° F., both cabbage samples and one potato sample were discoloured and unacceptable. The other potato samples, however, and all the carrots and onions were in fair condition, as were all the vegetables stored at 36° F. and 65° F., except the cabbage. About one-half the niacin, 12% to 50% of the ascorbic acid, 37% to 100% of the riboflavin, all of the thiamine, and 36% to 64% of the carotene of the freshly dehydrated vegetables remained in the stored samples. Storage in CO_2 did not affect niacin, thiamine, or riboflavin, but improved the retention of ascorbic acid and carotene. [Authors' summary.]

1406. MITCHELL, H. K., AND OTHERS. 577.16
Folic acid.
J. Amer. chem. Soc., 1944, **66**: 267-78.
I. MITCHELL, H. K., SNELL, E. E., AND WILLIAMS, R. J.
Concentration from spinach, pp. 267-8, bibl. 4.
II. FRIEDEN, E. H., MITCHELL, H. K., AND WILLIAMS, R. J.
Studies on absorption, pp. 169-71, bibl. 4.
III. MITCHELL, H. K., AND WILLIAMS, R. J.
Chemical and physiological properties, pp. 271-4, bibl. 17.
IV. MITCHELL, H. K.
Absorption spectra, pp. 274-8, bibl. 9.

Investigations on the vitamin, folic acid, for which the approximate empirical formula $C_{15}H_{15}O_8N_5$ is given, were carried out at the University of Texas and at the Clayton Foundation for Research.

1407. RUDRA, M. N. 577.16: 546.711
Role of manganese in the biological synthesis of ascorbic acid.
Nature, 1944, **153**: 743-4, bibl. 9.

The synthesis of vitamin C was shown to be increased in germinating *Phaseolus radiatus* when 0·002% manganese was added to the solution, as indicated by feeding tests with guinea pigs. The results of these and other experiments with guinea pigs are regarded as supporting the author's hypothesis that manganese is indispensable for the synthesis of ascorbic acid by plants and animals. The investigation was carried out at the Prince of Wales Medical College, Patna.

1408. STRACHAN, C. C. 663.813: 634.11: 577.16
Factors influencing ascorbic acid retention in apple juice.
Publ. Canada Dep. Agric. **732**, 1942, pp. 31, bibl. 63, being *Tech. Bull.* **40**.

Freshly made apple juice was found at Summerland Experiment Station to contain as much ascorbic acid as the fresh juice, i.e. about 7 mg. per 100 ml. Owing to the fact that it is present in its unstable form as (dehydro) ascorbic acid it disappeared almost completely within 2 weeks after canning. It could be shown, however, that it is feasible to fortify the juice with ascorbic acid at the rate of 20 mg. or more per 100 ml. by mixing dissolved ascorbic acid crystals into the deaerated juice, which is then flash pasteurized and canned without delay. It was essential to replace the oxygen in the container by an inert gas. After 3 months' storage fortified apple juice treated in this manner was found to retain over 90% of the added ascorbic acid. The method of canning fortified apple juice is described in detail and data are given on the inactivation of the ascorbic acid oxydizing enzyme and on the gas content of apple juice.

1409. FORGACS, J. 663.813: 634.11
Effects of alternate freezing and thawing upon the normal microflora of various apple juices.
Ill. Hort., 1944, **33**: 2: 5-6.

That freezing after pressing is not a method of sterilization in the case of apple juice but that it may keep the organisms which would normally develop in a state of suspension and that it forms a good method of storage, provided the juice is consumed soon after thawing, is the conclusion reached at the University of Illinois, where the effects of such treatment on the normal microflora of apple juice have been investigated.

1410. NEUBERT, A. M. 663.813: 634.11
The effect of concentration on the composition and properties of rediluted apple juice.
Fruit Prod. J., 1944, **23**: 166-9, bibl. 4, being *Sci. Pap. Wash. agric. Exp. Stat.* **582** and *Contr. agric. chem. Res. Div.* **120**.

Enzyme-clarified and untreated filtered apple juices were concentrated by (1) evaporation under vacuum, (2) freezing. The concentrates were then diluted and compared with the original juice. It was found that juices concentrated by freezing retained nearly all their aroma, whereas in concentration under vacuum nearly all of it was lost. Methods have, however, been developed to reduce this loss by recovering the volatile fractions. Only the enzyme-clarified juices remained clear after heat treatment. Data on the comparison of reconstituted and original juices are presented in 5 tables.

1411. JENNY, J. 663.813
Die wissenschaftlichen Grundlagen der Süssmosteinlagerung under Kohlensäuredruck. Die Aufnahmefähigkeit der alkoholfreien Trauben- und Obstsäfte an Kohlendioxyd. IV.* **(The scientific basis of fruit juice storage under CO_2 pressure. The absorption capacity of non-alcoholic grape and fruit juices for carbon dioxide.** Part 4.) [French summary ½ p.]
Landw. Jb. Schweiz, 1944, **58**: 149-62, bibl. 6.

Graphs and experimental data adequately documented are followed by German and French summaries, the sense of which is as follows: In view of the fact established in a previous trial that absorption capacity and concentration of CO_2 decrease with increasing temperature and so may allow fermentation to take place, the effect of temperature is obviously important. In the present work the changes thereby induced have been investigated by simple methods. Results also show what had been previously surmised, namely that clarity affects both absorption capacity and concentration. The cloudier the juice, the less the absorption. Change of storage temperature with no change in CO_2 volume resulted in increased or decreased fermentation. Even when submitted to storage in CO_2 for several months the yeasts did not completely lose their vitality and a lowering of pressure resulted in the resumption of fermentation. Even in these days of centrifuging and refrigerating, which reduce the risk of fermentation to a minimum, there would appear to be considerable point in determining the reasons for the phenomena observed and drawing the attention of technicians to them.

1412. THERON, C. J. 663.2
Wine making on a small scale for home use.
Frmg S. Afr., 1943, **18**: 867-70, 880.

Instructions given by the Director of the Viticulture-Oenology Institute, Stellenbosch-Elsenburg, South Africa.

* For notes on Parts 1-3, see *H.A.*, 10: 386, 11: 988, 12: 678.

1413. ATKINSON, F. E. 663.39+663.25
Household wine making.
F.P. Summerland exp. Stat. **27** (revised), 1942, pp. 3, stencil.
Hints are given on making wine from the following: cherries, berry fruits, apricots, rhubarb, parsnips, fresh prunes, dandelions.

1414. JACOB, H. E. 634.873
Factors influencing the yield, composition, and quality of raisins.
Bull. Calif. agric. Exp. Stat. **683**, 1944, pp. 1-44.
Thompson Seedless, sultana, golden-bleached, sulfur-bleached, soda-dipped, and oil-dipped types of raisins are made from Thompson Seedless grapes; Zante currants or currants from Black Corinth; and Muscat, Malaga, Valencia, and lexia types from Muscat of Alexandria. In raisins, seediness or seedlessness and distinctive flavours are characteristic of the grape variety used. Other factors of quality influenced by the maturity and condition of the fresh fruit, by the drying method, and by conditions of drying and storage are: hue, uniformity, and brilliancy of colour; berry size; condition of the surfaces; texture of skin and pulp; moisture content; chemical composition; presence of sand or other foreign matter; decay; and insect infestation. Experiments were made to determine the influence of grape maturity and twelve drying methods on the yield and composition of Thompson Seedless and Muscat raisins. Yield with Thompson Seedless was proportional to the Balling degree of the grapes. Increases in yield with Muscat lagged slightly behind those indicated by the increase in Balling degree. With both varieties, as grape maturity advanced, the size of the raisins, the weight per unit volume, and the sugar content of the raisins increased, while the acid and insoluble-solids content decreased. The changes in sugar and insoluble solids in the raisins nearly ceased when the grapes reached 23° or 24° Balling, but the acid continued to decrease slowly. Calcium and magnesium remained constant in the raisins of both varieties; phosphorus decreased; potassium was constant in Thompson Seedless, but decreased in Muscat. Quality improved as the grapes ripened. The colour of the fresh grapes influenced the colour of light-coloured raisin types such as golden-bleached, sulfur-bleached, and sultana. Drying methods involving dehydration or a hot dip produced slightly higher yields of raisins having a slightly higher sugar content and a lower insoluble-solids content than did other methods. Bleaching the grapes with SO_2 increased the acid content of the raisins. The quality of natural Thompson Seedless raisins is closely correlated with acid content and with weight per unit volume. With light-coloured types neither of these measurements proved to be a good index to quality because of the very high value attached to the hue and brilliancy of the colour. The sugar content of the raisins cannot be used as an index to quality because the differences involved are so small.

H.E.J.

1415. SORBER, D. G. 664.85.21.047
The relation of the sulfur dioxide and total sulfur contents of dried apricots to color change during storage.
Fruit Prod. J., 1944, **23**: 234-7, 251, bibl. 10, being *Contr. agric. chem. Res. Div.* **111** and *Outside Publ. Ser.* **3949**.
Sulphured and unsulphured lots of dried apricots were analysed (1) after completion of a 5-day drying period in the yard, (2) after 17 months' storage in friction-top tin cans at room temperature and (3) again after 10½ years. The total sulphur was found to remain constant throughout the storage period, whilst the sulphur dioxide finally decreased to less than 10% of that originally present. Owing to oxidase activity the unsulphured fruit developed a dull and dark brown colour, sulphured apricots being black on the surface after prolonged storage and smelling of caramelized sugar. Freshly torn surfaces of the latter were dark brown. It is suggested that the dark colour of sulphured fruits results from a reactivation of oxidase after prolonged storage associated with a decrease in sulphurous acid content and that the odour is due to the destruction of the fruit sugars by sulphuric acid. The tests were carried out at the Bureau of Agricultural Chemistry and Engineering, Los Angeles.

1416. TRESSLER, D. K., AND MOYER, J. C. 664.8.047
Dehydrated food in the postwar era.
Fruit Prod. J., 1944, **23**: 239-41.
The prospects of food dehydration after the war are discussed and the setting up of a research laboratory by an association of food processors is advocated.

1417. OWEN, R. C., AND BETTENAY, W. J. 664.85.047
The preservation of fruits in the home.
J. Dep. Agric. W. Aust., 1943, **20**: 322-31.
Instructions are given on the home drying of all suitable fruits grown in Western Australia.

1418. TRESSLER, C. J., Jr. 664.85.76.047
A determination of the critical drying temperature of cranberries.
Fruit Prod. J., 1944, **23**: 243, 249.
The results of this study of the maximum temperatures, to which cranberries may be safely heated in the dehydration process in relation to a particular stage of dryness, are summarized in a table.

1419. MENENDEZ LEES, P., AND BERGERET, G. 664.85.3.047
Deshidratación de frutas citricas para elaborar mermelada. **(Drying citrus fruits for marmalade.)**
Reprinted from *Rev. Fac. Agron. Montevideo*, 1942, No. 30, pp. 11, bibl. 4.
A method of dehydrating various kinds of citrus is described. Fruit so treated is in perfect condition for making into marmalade at a later date and the process might be useful in dealing with surplus citrus in glut years.

1420. PRATER, A. N., AND OTHERS. 664.8.047
Determination of sulfur dioxide in dehydrated foods.
Industr. Engng Chem. (*Analytical Edition*), 1944, **16**: 153-7, bibl. 12.
Details are presented of a rapid direct titration method for determining sulfur dioxide in dehydrated foods. The reliability of the method has been established by recovery of added sulfur dioxide and by comparison with distillation and polarographic methods. [Authors' summary.]

1421. ANON. 664.84.047
Analysis of processing costs in vegetable dehydration.
Fruit Prod. J., 1944, **23**: 174-9, 189.
Information sheet from Western Regional Research Laboratory, Albany, Calif., Bureau of Agriculture and Industrial Chemistry, U.S. Department of Agriculture.

1422. LEMBO, F. E. 634.87-1.56
Contribución al estudio del aprovechamiento de los subproductos de la uva. **(Vine by-products.)**
Reprinted from *Rev. Fac. Agron. Montevideo*, 1943, No. 32, pp. 36, bibl. 12.
The possibility is examined of using the skins and seeds of grapes in Uruguay after the fruit has been pressed. Alcohol can be obtained from the skins, oil and cake for stock-breeding from the seeds, and other products are also mentioned. Analyses and brief technical descriptions of the methods of manufacture are given.

1423. Division of Food Preservation, C.S.I.R., Australia. 634.3+664.85.3
The utilization of citrus residues.
Food Pres. Quart. Aust., 1943, **3**: 34-42, bibl. 11.
Over 200 tons of waste citrus residue are produced in Australia daily in process plants. These residues could form a valuable source of revenue if properly treated. At present they are thrown away. Brief notes are given on a variety of products that could be obtained, such as essential oils, marmalade mixture, ensilage, stock feed after liming. The manufacture of pectin is treated at some length and the various processes are described.

1424. Charavanapavan, C. 635.659
The utilization of the sword-bean and jack-bean as food.
Trop. Agriculturist, 1943, **99**: 157-9, bibl. 7.
The sword-bean, *Canavalia gladiata*, is a perennial climber; the jack-bean, *C. ensiformis*, is an annual bush. The beans of both contain a sapotoxin that renders them unsuitable for food without previous treatment, though otherwise the seeds are nutritious. The sapotoxin was found to occur in appreciable quantities only in the endosperm of the seed. The sapotoxin can be destroyed by heat, but the seeds must be ground into meal, otherwise in the whole seed the sapotoxin remains occluded and is not brought into solution during the cooking and destroyed. The sapotoxin in mature, whole seeds can be brought into solution by boiling the seeds, soaked overnight in water, with sodium carbonate or wood ash. The tender pods and under-mature seeds are non-poisonous and can be cooked and eaten without precautions. Various methods of utilization of these two beans for human food are described.

1425. Croce, F. M. 664.85.75
Conservación de frutillas al natural. (**Bottling [or canning] strawberries.**)
Rev. B.A.P., 1944, **27**: 316: 27-31.
The method described is the Appert method; the varieties selected are those recommended by Campden Fruit and Vegetable Preservation Research Station as being the best available though not perfect, namely Sir Joseph Paxton, Royal Standard, Stirling Castle, Aberdeen Standard.

1426. Armstrong, G. B., and Black, L. S. 664.84.035.2
Preserving vegetables by salting.
Circ. Ill. agric. Exp. Stat. **538**, 1942, pp. 4.
Hints on dry salting for the production of sauerkraut, sauer rüben (sour turnip) and sour rutabagas, on storage of treated vegetables, on preparation of salted corn, and on the brining of cucumbers, wax beans, green tomatoes, green peppers, cauliflowers and onions.

1427. Hohl, L. A. 664.85.63.036.5
Notes on slow freezing and thawing of canned olives.
Fruit Prod. J., 1944, **23**: 242.
Processed canned foods being occasionally exposed to very cold temperatures under present transport conditions, the influence of freezing and thawing on canned olives was studied at the University of California. Although the treatment was found to have a deleterious effect, particularly on the texture of the fruit, the olives need not be considered a total loss; the change may not even be noticeable to many consumers.

1428. Scott, W. J., and Stewart, D. F. 664.84.11.036.5+664.84.13.036.5
The influence of dissolved tin on the growth of *Clostridium botulinum* in canned vegetables. 1. Experiments with beetroot and carrots.
J. Coun. sci. industr. Res., 1944, **17**: 16-22, bibl. 8.
Several strains of *Clostridium botulinum* were found to grow and to produce toxins if inoculated into lacquered cans of beetroot and carrots, whilst their development was checked by the dissolved tin of unlacquered cans. The same bacteriostatic effect was produced by adding approximately 150 p.p.m. and 30-60 p.p.m. of a soluble tin-citrate complex to beetroot and carrots respectively in lacquered cans.

1429. Scott, W. C., and Pentzer, D. J. 664.774.035.5
Preservation of pineapple with sulfur dioxide.
Fruit Prod. J., 1944, **23**: 206, 213, 217, bibl. 2, being *Contr. agric. chem. Res. Div.* **133**.
Sulphur dioxide, but not sodium benzoate, was found to preserve pineapple satisfactorily in experiments conducted at the U.S. Department of Agriculture Fruit and Vegetable Products Laboratory, Weslaco, Texas. Colour and flavour were maintained as well, if sulphurous acid was used. Vigorous boiling for 20 minutes was sufficient to remove the sulphur. Although preservation in large pieces is satisfactory, crushing is recommended for convenience. Blanching was shown to be inadvisable.

1430. Reinhold, J., and Lucas, H. 664.583
Ein Beitrag zur Frage des Hartkochens von naturgesäuertem Gemüse. (**The cooking of pickled vegetables.**)
Gartenbauwiss., 1943, **18**: 1-26, bibl. 5.
Extensive experiments were carried out at Pillnitz on Elbe in order to devise methods of preventing pickled vegetables from remaining hard after cooking. It was shown that beans, carrots, celeriac and onions will cook soft if cooked or blanched before pickling. The effect of various treatments on the chemical composition of the material is described in great detail.

1431. Benham, G. H. 577.16: 581.192
The antimony trichloride method for the determination of vitamin A.
Canad. J. Res., 1944, **22**, Sec. B, pp. 21-31, bibl. 48.

Barton-Wright, E. C., Emery, W. B., and Robinson, F. A. 577.16
New components of the vitamin B complex.
Nature, 1944, **153**: 771, bibl. 4.

Levy, L. F. 577.16
The determination of ascorbic acid in the presence of sulphur dioxide.
Biochem. J., 1943, **37**: 713-4, bibl. 4.

Levy, L. F. 577.16
The determination of ascorbic acid in the presence of interfering substances, notably reductones.
Biochem. J., 1943, **37**: 714-6, bibl. 5.

Reinhold, J. 664.84
Die Grundlagen der biologischen Gemüsekonservierung. (Gärgemüsebereitung.) (**Retaining the valuable substances in vegetables preserved by the fermentation method.**)
Ernährung, 1941, **6**: 201-24, from abstract *Gartenbauwiss.*, 1942, Vol. **17**, abstr. pp. 70-1.

Larson, P. S., and Haag, H. B. 633.71: 581.192
Quantitative determination of nicotine and nornicotine in mixtures.
Industr. Engng Chem. (*Analytical Edition*), 1944, **16**: 86-90, bibl. 13.

Jacobson, M., Acree, F., Jr., and Haller, H. L. 633.853.74
Determination of sesamin.
Industr. Engng Chem. (*Analytical Edition*), 1944, **16**: 166-7, bibl. 9.
In sesame oil.

Baker, G. L., and Woodmansee, C. W. 547.458.88
Polyphosphates in the extraction of pectin.
Fruit Prod. J., 1944, **23**: 164-5, 185, bibl. 9.

ATKINSON, F. E. 663.3
Apple cider.
F. P. Summerland exp. Stat. **42** (revised), 1942, p. 1. Stencilled.

RIPPEL, K. 663.2
Der bakterielle Abbau der Apfelsäure im Wein als Folge biologisch aktiver Wirkstoffe (Biokatalysatoren in den Weinbeeren). **(Bio-catalysts contained in grapes causing decomposition of malic acid in wine.)**
Ber. dtsch. bot. Ges., 1942, **60**: 108-17, from abstract *Gartenbauwiss.*, 1943, Vol. **18**, abstr. pp. 28-9.

WILSON, J. B. 633.813: 634.3
Determination of peel oil in citrus juices.
J. Ass. off. agric. Chem., Wash., 1944, **27**: 201-4.

WILSON, J. B. 663.813: 581.192
Persistence of monochloracetic acid in fruit juices and carbonated beverages.
J. Ass. off. agric. Chem., Wash., 1944, **27**: 195-200.

BALLANTYNE, J. A. 664.85.047
Drying fruits in the home.
Agric. Gaz. N.S.W., 1944, **55**: 66-9.

PEILE, R. M. 664.85.22.047+664.85.21.047
Home drying of plums and apricots.
J. Dep. Agric. Vict., 1944, **42**: 38-9.

ATKINSON, F. E. 634.23-1.56
The manufacture of sulphurous acid from crude sulphur for bleaching cherries.
Reprint from *Canad. Hort.*, undated, pp. 2+ working diagram.

FABIAN, F. W., AND BURTRAW, H. J. 633.832
Solubility studies on whole cloves.
Fruit Prod. J., 1944, **23**: 196-9, 215.

DVINIANINOVA, I. L., AND SAVVINA, A. G. 633.171: 633.85
Practically important properties of millet oil.
C.R. Acad. Sci. U.R.S.S., 1941, **33**: 248-50, bibl. 6.

SREERANGACHAR, H. B. 633.72-1.56
Studies on the "fermentation" of Ceylon tea, parts 4, 5, 6 and 7, bibl. 40.
Biochem. J., 1943, **37**: 653-74.

NOTES ON BOOKS AND REPORTS.

1432. NEWMARK, M. 41.3:5=2=4=3=6
Dictionary of science and technology in English-French-German-Spanish.
Philosophical Library, N. York, 1943, pp. 386, price in England, 37s.

It is claimed in the preface that translators will find here a more complete list of current scientific, technical and aeronautical terms than is obtainable from any other bi-lingual or multi-lingual dictionary. To go further, it is said to contain 10,000 current terms in the English language most often used in the physical sciences, with separate indices in the other languages. Botany and horticulture are not among those sciences, chemistry, engineering and wireless telegraphy are, hence if one wished to build a ship in four languages it would probably prove most useful, but not if one wished to dissect a flower head or plant an orchard.

1433. RAMSBOTTOM, J. 635.8
Edible fungi.
King Penguin Books, London and N. York, 1943, pp. 35+16 col. pl., 2s.

The author notes that of the toadstool type of fungi probably not more than a dozen can be regarded as poisonous, "but of these one at least, *Amanita phalloides*, causes intense agony followed frequently by death: it is unlikely that any other species causes death in healthy people". So having been adequately warned we can proceed to a consideration of the 20 kinds of edible fungus recommended and carefully described by the author. Most of them will be found also in the Ministry's Bulletin (*Bull. Minist. Agric. London*, 23). Those which occur only in the present work are *Amanitopsis vaginata*, *Lactarius deliciosus*, *Boletus versipellis*, *Fistulina hepatica* and three small puffballs. The descriptions, excellently illustrated, are as good as any seeker after strange delights can desire and the hints on cooking make one's mouth water, though prematurely, it must be admitted, in those cases where olive oil and butter enter into the recipes. "The smell is sweet. It occurs under conifers in autumn" or again "The parasol mushroom should be cooked quickly. It is best when broiled in butter over a hot fire or in omelettes or meat pies". One reviewer at least regrets that this book is bound to be a best seller and that converts to mycophagy may be all too numerous.

1434. SMITH, G. 663.1: 582.8
An introduction to industrial mycology.
Edward Arnold & Co., London, 1942, (2nd edit.), pp. xii+260, 20s.

This book, the first edition of which was published in 1938, is primarily intended for industrial chemists with little or no mycological training, but much of it is of value to agricultural and horticultural mycologists. Chapters I and II are introductory, the first dealing with the general classification and terminology, and the second with the nomenclature of the fungi. In chapters III to IX are described some of the fungi most commonly encountered in industrial mycological work. These include members of the Zygomycetes and Ascomycetes, yeasts and Fungi Imperfecti. A complete chapter is devoted to the yeasts and related forms and information is given on methods of culture and identification. In the chapter on Hyphomycetales there is a useful key for the identification of the common genera of this group. The genera Aspergillus and Penicillium are described in considerable detail and the chapters on these fungi constitute a very useful aid to their identification and study. A notable feature of these descriptive chapters is the very remarkable series of photomicrographs, which greatly facilitate the identification of many species. In the second half of the book is an account of laboratory methods and technique, in which there are many points of general interest to mycologists The physiology of mould fungi, the control of mould growth and the industrial uses of fungi are briefly described. In a chapter on the maintenance of culture collections there is some useful advice on the control of mites in fungal cultures. Each chapter has a bibliography and there is also a list of general works of reference.

W.G.K.

1435. COPLEY, G. H. 581.9+632.51
Wild flowers and weeds.
John Crowther, London, 1944, pp. 164, 8s. 6d.

An account of a number of the more frequent wild flowers of Britain, told month by month, and a description of some of those sufficiently prevalent to be classed as weeds. In its way an attractive book which should, as its author desires, enable "those who have more than a passing interest in Nature to satisfy their longing", at least in part. The method he employs is to select certain plants of the month and to discuss a few more or less interesting botanical facts in relation to their main features, e.g. honey guides, why grass leaves are not serrated, the purpose of plant latex and so on, contriving in this way to cover, though in somewhat inconsequential fashion, quite a wide field. So wide is the field in fact, that the absence of a signpost in the form of an index is a considerable inconvenience. The monthly story is told in a pretty "Children's Hour" manner

calculated to infuriate any right-minded infant over thirteen, though less sophisticated adults may enjoy it. The weeds are treated in a more businesslike way. Evidently Mr. Copley does not like weeds. The impression of a kind Victorian governess addressing little Fanny on the Wonders of Nature is now dimmed and disappears completely in the final chapter with its cold-blooded instruction for wholesale massacre of the intruders by ruthless chemical warfare of the most total sort. Granny turned wolf with a vengeance ! The number of local or alternative names which the author has managed to collect for these weeds is remarkable and adds much to the interest. The book closes with a useful glossary. Mr. Copley is a distinguished and learned writer on matters horticultural, he knows what he is talking about and readers of this or any other of his works can be sure that they are being correctly informed. The photographs which illustrate the book are excellent.

1436. Arizona. 633/635
Fifty-fourth Annual Report of the Arizona Agricultural Experiment Station for the year ending June 30, 1943,
1944, pp. 95.

Work of horticultural interest includes the following: The University has been presented with a 40-acre citrus grove in the Salt River Valley. This will be used for investigations. Trials show that increased applications of nitrogen during the ripening period results in decreased vitamin C content in grapefruit juice. Seven years' observations show that under the conditions obtaining only the addition of nitrogen has increased fruit yields. Leaves in all plots supplied with nitrogenous fertilizer tend to have the same content of phosphorus, calcium and potassium regardless of whether these elements have been applied or not. Ratios have been established as between N and the other elements, though at present their significance is obscure. Work on the Salt River Valley Vegetable Research Farm has embraced lettuce manuring, cantaloupe breeding and selection, lettuce breeding and selection, tomato and onion production. In addition the possibility of large-scale vegetable seed production is under examination. Work continues at the Yuma Valley Date Garden. The entomologists are studying the lac-producing insects (scales) of the State. Several pests and diseases of guayule are under examination. Kok saghyz was found to be attacked by *Rhizoctonia solani*, *Fusarium solani* and by nematodes. Investigations are in progress into dry rot of citrus, watery brown rot of lettuce (*Sclerotinia sclerotiorum*), and Texas root rot of pecan.

1437. Ceylon Coconut Research Scheme. 634.61
Annual Report of the Coconut Research Scheme for 1942.
Sessional Pap. Ceylon V, 1944, pp. 17, 35 cents.

The following notes are summarized from reports of the technical officers. *Manioc drying*. A good, dry, granular product which could be readily milled to flour was obtained from manioc dried in desiccated coconut machinery and in a Pearson copra drier. *Dwarf palms*. In the dwarf palm trials [see previous report, *H.A.*, 13: 1093] 23 seedling palms out of a 10-acre block flowered in their third year from planting. *Selected planting material*. In 1941, 8,332 selected seedlings were issued to peasants, in 1942 all records were broken with the issue of 33,647. In addition, 54,745 graded seed nuts were distributed and the year's plantings probably reach 10,000 acres. *Manuring*. In the seventh year of the NPK manurial experiment at Bandirippuwa, P gave as usual no increase. Potash effect was even more marked than before with an increase of 23% for K, and 31% for K_2, the increases for 1941 being 12% and 18%. N, as before, either depressed yield or gave insignificant increase. High P depressed the uptake of K, especially in plots receiving no K, and this effect is increasing annually. In experiments (not yet analysed) young palms receiving no fertilizer increased 6·02 ft. in height, those receiving NK 6·92 ft. and NPK 7·12 ft. This experiment will be more useful when the effect on early flowering and on yield can be studied. *Fodder grass*. In the third year the growing of fodder grass between palms depressed yield by 26% (17% in 1941). NPK on the no fodder plots increased nut yield by 48% and gave no increase in nut yield on the fodder plots, though it increased the fodder yield 8-fold. Laboratory analyses support the field evidence that applications of phosphoric acid of the order of 1 lb. and over per palm are unnecessary. A list of papers published by the officers of the Scheme in 1942 is appended.

1438. Gold Coast. 633.74-2.8
Report of the Department of Agriculture, Gold Coast, for the year 1942-3,
1943, pp. 8, 1s.

The chief interest in this report will be found in the account of the steps taken to combat the new swollen-shoot disease of cacao. An extended survey revealed fresh outbreaks. Spraying was omitted from the treatment and this enabled cutting out to be done soon after discovery. Several seizures were made at road barriers against the transference of planting material. Even when only a few trees are infected it has been found expedient to remove an outer ring of uninfected trees besides those definitely infected. The progress of the disease is slow enough to allow of a survey of the whole cocoa belt to discover in which areas treatment would be most effective in protecting the industry, providing this could be accomplished within a year or two. The only hope of control lies in the distribution of immune types, which, so far, have not yet been discovered, though variations in resistance have occurred.

1439. Horticultural Education Association. 634/635
Occasional Publications of the H.E.A.
Nos. 1-3 (1939-42). Abridged Edition with Supplement 1943, pp. 100.

This brings together under one cover the information previously issued separately as O.P. 1 (see *H.A.*, 10: 434), O.P. 2—mainly concerned with vegetable seeds—(see *H.A.*, 11: 780) and O.P. 3—issued in February 1942 and marked "Confidential"—and adds a review on the Luxmoore Report in relation to Horticulture. The papers by leading authorities and the discussions thereon, which together form the bulk of O.P. 3, were given at an H.E.A. Conference held in London on 6 October, 1941. Although primarily concerned with wartime problems, many of them have a much wider interest. They concern the following subjects: Plans for vegetable production in fields and private gardens in wartime (3 papers and discussion 6 pp.); wartime problems of glasshouse growers (2 papers and discussion 6 pp.); supply of horticultural seeds in wartime (2 papers 7 pp.); manuring of fruit and vegetables in wartime (4 papers and discussion 6 pp.); wartime fruit surveys and the future of fruit planting (3 papers and discussion 6 pp.). Finally the memorandum prepared by the H.E.A. for the Luxmoore Committee on Agricultural Education and a Review of the Luxmoore Report (the review published here for the first time) are given.

1440. Iowa. 633/635
Report on Agricultural Research of the Iowa Agricultural Experiment Station for the year ending June 30, 1943,
Part I, pp. 298; Part II, pp. 79.

Part II is the 8th annual report of the Corn Research Institute. Part I contains information on project reports, publications, staff and finance. The Horticulture Section activities are detailed on pp. 196-221. Notes are given on the following, among other, subjects. The growth and maintenance of fine turf grasses. Soilless culture of roses, chrysanthemums and stocks in the greenhouse, the media used being muscatine gravel and crushed clay tile. The roses and stocks thus grown were superior to the controls,

the chrysanthemums equally good. While the English dwarfing apple stocks have not proved hardy enough, a hardy stock which produces dwarfing in the finished tree, when used as an intermediate, has been developed. Selected seedlings from apple breeding experiments indicate that hardiness and desirable fruit characteristics are obtainable. Pear, plum and peach breeding are also in progress. Black raspberries are being successfully bred for resistance to anthracnose and for hardiness. Hibernal and Virginia crab are showing different stock influence when used as intermediates for Hawkeye Greening and other apples. Hardy rose stocks are being successfully raised, some being uninjured by temperatures of $-20°$ to $-22°$ F. Experiments continue on the preparation of vegetables and fruit for refrigerated locker storage. Gas storage and the use of pliofilm in ordinary apple storage are being investigated. Vegetable investigations include studies on harvesting asparagus, sweet potato storage, manuring of sweet potatoes and melons, onion breeding. Other subjects under investigation include the cultivation and management of the hemp crop, soil problems, melon breeding, control of nursery diseases among small ornamentals and fruit tree stocks, rubber production—*Asclepias* spp. show greater promise than kok saghyz—, codling moth control, effects of handling on vitamin C content in apples.

1441. LAUSANNE (FAES, H.). 634/635
Rapports annuels 1941 et 1942 de la station fédérale d'essais viticoles et arboricoles à Lausanne et Domaine de Pully. **(Annual reports for 1941 and 1942 of the Federal Viticultural Research Station of Lausanne and Domaine de Pully.)**
Landw. Jb. Schweiz, 1943, **57**: 462-98.

Division of Physiology and Plant Pathology. Fruitgrowing. Spray problems have been to the fore, notably the use of Nirosan and Gesarol as arsenical spray substitutes. Against grape moths Gesarol and spreader in wet form and Nirosan both proved equally satisfactory. The station is now in a position to recommend different varieties of plums and apples for particular localities. It is still working on the breeding and selection of late apple and pear varieties. It has published an account of its recent work on fruit storage. Among conclusions reached are the following: To ensure good storage proper spraying in the field is essential, the rejection of blemished fruits before storing, the yearly disinfecting of all stores. The time interval between picking and storing should not exceed 24 hours for early pears and apples or 10 days for later varieties. Strict attention must be paid to temperature and humidity in the store. Experience at Montagibert shows that the best temperatures for apples lies between $+2°$ and $+4°$ C. and the optimum humidity between 85% and 90%. Higher temperature combined with insufficient humidity results in loss of weight. Wax coating has proved excellent for certain rough skinned varieties prone to wrinkling such as Belle de Boskoop and Reinette du Canada. The spread of the San José scale in named Provinces of France and Italy is becoming a serious menace to Swiss fruit. Gesarol and Nirosan were only comparatively successful against codling moth, but better results were hoped for from a revised form of Gesarol in 1943. Against other insects they proved satisfactory. Notes are given on other important diseases of vegetables. *Division of Chemistry and Bacteriology.* Studies on wines and ciders of different origin and on fruit juices are noted. The work of the Domaine de Pully is considered separately. A list is given of publications of members of staff during the years in question.

1442. SAMPSON, H. C., AND CROWTHER, E. M. (LEVERHULME TRUST.) 633/635(66)
1. Crop production and soil fertility problems. The West African Commission 1938-1939 Technical Report I, 1943, pp. 1-58.

The authors consider in turn the geology and soils of West Africa, its climate, crop plants and types of agriculture, plantation agriculture in West Africa, the departments of agriculture and their work, agricultural problems in other departments, scientific research and survey. They give a concise and comprehensive account under these different headings, so that the reader gets an insight into the general problems of the different territories. Among suggestions made for the strengthening of agricultural research in West Africa is that "there is room for a team of specialists working under a scientific director, in either a separate department or under a council representing the various branches of the governments concerned. This body should be charged primarily with the scientific study and survey of all aspects of West African agriculture and industry". It would cover at least all four British Colonies. As regards ecology, it is not proposed that the experimental work of the individual departments should be reduced in any way, but it is suggested that a team of specialists should be provided, some of whom would be peripatetic, who would work with the departments on the more technical and long-range questions and would co-ordinate more efficiently than has hitherto been possible the fund of local knowledge acquired. On the question of field experiments it is suggested that the time has now come when work previously undertaken for the amelioration of a system of mixed farming based on farmyard manure should be supplemented by research on fundamental questions. This idea is briefly elaborated. Meteorology and the collection of data typical of more than the carefully chosen climates of District Headquarters also merit closer attention. The report can be recommended both to interested laity and experts, to the intelligent outsider and to the expert on the spot.

1443. MACAULAY INSTITUTE. 631.4: 633/635
Annual Report of the Macaulay Institute for Soil Research 1942-43, pp. 32.

Reports are given of several investigations of horticultural or potential horticultural interest. *Peat and compost investigations.* These have included tests of a commercial growth-promoting medium—not yet concluded—, composting trials using market garden refuse and tests of biotite schist as a source of potash in horticulture. This schist is found to be of limited value and to be inadequate as the sole source of potash. Other trials continuing those of the previous year indicated again that there is no detectable difference between the manurial effect of peat plus artificials and dung. *Spectrographic investigations.* The cathode layer arc method has been chiefly used and that mainly in the continued study of the relationship of soil content of trace constituents to uptake by the plant. Some 7,000 samples of soil extracts or solutions of plant materials were examined during the year by the Lundegårdh flame emission method. On an average 3 elements were determined in each sample; for acetic acid soil extracts only potassium was determined, while for exchangeable cations in peat and soil profiles, calcium, magnesium, strontium, potassium, sodium and manganese were determined. The use of the Hilger Spekker Absorptiometer for the determination of trace constituents is being extended. Work on concentration methods prior to spectrographic analysis continues. A table of Gaussian or subtractive logarithms is given in an appendix.

1444. MAURITIUS. 633/635
Annual Report of the Department of Agriculture, Mauritius, 1942, 1943, pp. 27, 50 cents.

Notes are given of work, mainly routine, at various centres including the Central Experimental Station, Reduit, Barkly Experimental Station, Beau Bassin, and the Royal Botanical Gardens, Pamplemousses. At Barkly there are trials of *Cinchona succirubra* seedlings and of *Hydnocarpus wightiana*, and the possibility of producing temperate vegetable seed locally is being investigated. It may be noted that there are now 1,278 acres under tea in the island. Diseases under study by the Division of Plant Pathology include a disease

of citrus characterized by chlorosis, die-back and ultimate death, a leaf disease of sisal, wilt of vanilla, rot of sweet potato and yam, etc. Pests under investigation by the entomologists include various fruit flies. The Chemical Division includes in its work studies on aloe fibres, hydnocarpus oils and herbe condé (*Cordia interrupta*). Breeding and other work is reported from the Tobacco Research Station.

1445. National Institute of Agricultural Botany, Cambridge. 631.531
Twenty-third Report of the National Institute of Agricultural Botany, 1941-42, 1944, pp. 15.

The Council of the Institute set up in February 1942 a Seed Production Committee which included representatives of the Ministry of Agriculture, Agricultural Seed Trade Association, Horticultural Trades Association, National Association of Corn and Agricultural Merchants, National Farmers' Union, Seeds Import Board and the Institute. It was formed into 2 sections, one of which was to be concerned with roots and vegetable seeds. Very brief notes are given on the existence of trials in different parts of the country on sugar beet, flax, swedes, mangolds, brussels sprouts, onions, carrots, garden beet, haricot beans, soya beans, maize and potatoes.

1446. Nyasaland. 633.85
Annual Report of the Tung Experimental Station, Nyasaland, for 1943, Zomba, 1944, pp. 17, mimeographed.

Selection of promising mother trees of *Aleurites montana* on estate plantations continues. The results are hampered by the biennial or irregular bearing habits causing trees selected for high yield in one season to prove disappointing in the next or subsequent years. *A. fordii* trees are found to become unthrifty in Nyasaland at an early age and are consistently inferior to *montana*. Various trials with clonal material are in progress. Seedling tung made better growth than buddings from the same trees, but in another trial with unselected material budded plants gave nearly double the yield. Topworking of established male trees by budding on to the branches with scions of high-yielding mother trees has been successfully adopted in estate practice, but there are certain troubles, namely: (*a*) production of badly shaped trees owing to the scions growing up vertically and crowding the centre of the tree; (*b*) breakage by wind or crop weight; (*c*) dieback of stock branches below the union on the side remote from the scion. These difficulties can be largely overcome by budding on the secondary rather than the primary branches, but the method is more laborious and expensive. Topworking, however, is only a temporary expedient. All future plantings will be of young nursery buddings. Experiments are in progress in the production of legitimate seed from selected parents, and in the use of illegitimate seed from selected high yielders. Intercropping with maize or soya beans, for use as green manure, has given higher yields of seed, stronger tree growth and higher returns per acre than with an undercrop of *Calapogonium mucunoides* intended, but failing, to be permanent, or with a cover of the velvet bean. In clonal pollination studies trees were discovered which produced no male flowers or had insufficient open at the time. Thus the dangers of monoclone planting are obvious. Fruit thinning of clones which bear at an unusually early age, is probably desirable and an experiment has been laid down to test this. Pit storage of hulled or unhulled seed was marked by reduced germination in comparison with seed stored in bags in a dry store. A further experiment with storage at different relative humidities, although it must be regarded as inconclusive, gave indications that viability is best maintained under dry conditions. In nursery trials shallow sowing gave better germination than deep sowing in the cold season but there was no difference in the hot season. Mulching retarded germination in comparison with no mulching. Watering on alternate days on the unmulched plots gave better germination in cold weather, but in the hot weather daily watering was more productive.

1447. Queensland Department of Agriculture and Stock. 63(072)
The Queensland Journal of Agricultural Science, March 1944, Vol. **1,** No. 1, 4to, 10s. a volume or 2s. 6d. a number. Subscriptions to Under Secretary, Dep. Agric. Stk. Brisbane.

We welcome the first number of a new periodical, which is to be issued quarterly. Its purpose is the publication of scientific papers by officers of the department. Formerly these appeared in the *Queensland Agricultural Journal* or the *Technical Communications of the Bureau of Sugar Experiment Stations*. The first number contains a long article on nutrition in the banana [see abstract 1368] and much shorter ones on the natural waters of the Coastal Belt and on exchangeable sodium and the physical properties of soils. The journal is clearly printed on good paper. We wish it every success.

1448. Viljoen, P. R. (Union of S. Africa). 633/635
The agricultural industry after four years of war. Report of the Department of Agriculture and Forestry and of the Food Control Organization [of the Union of S. Africa] for the year ended 31 August 1943.
Fmg S. Afr., 1944, **19**: 131-210.

I. *Introduction* (pp. 131-48). This deals largely with supplies and economies. II. *Practical activities of the food control organization* (pp. 149-80). Among matters of horticultural interest are notes on the following: (1) The stimulation of production of vegetable seed. Whereas in 1939 nearly all vegetable seed was imported, a new national industry has now been built up. In nearly every case requirements are met and in some surpluses are available. (2) Dehydration and canning. The production of dehydrated vegetables was expected to reach a total of 1,000 tons by the end of March 1944. Provision has been made for the attainment and maintenance of quality. Canning of jam has increased and of vegetables has risen from 4,520,000 lb. in 1940/41 to 23,400,000 lb. in 1942/43. (3) Important food products. Notes are given on the production of groundnuts, potatoes and onions. III. *The other agricultural products*. Under this heading are considered the available supplies of tobacco, chicory, citrus, deciduous fruits, dried fruits, viticultural products and wattle bark and extract. IV. *The normal activities of the Department*. This includes work on erosion, weed control, plant diseases and pests, and locusts.

1449. Trinidad, Imperial College of Tropical Agriculture. 633/635
Report of the Governing Body and Principal's Report to December 31st, 1943.
St. Augustines, Trinidad, and Grand Buildings, Trafalgar Square, London, W.C.2, 1944, pp. 24.

The report contains short notes from the heads of the various scientific departments and a list of scientific papers published by the College during the year.

1450. Tucuman. 634/635
Memoria anual del año 1942. **(Annual Report of the Tucuman (Argentina) agricultural experiment station for 1942.)**
Rev. industr. agric. Tucumán, 1943, **33**: 33-149.

Tung. Aleurites fordii proved fairly resistant to spring frosts, though a particularly late one injured the flower buds in a few plantations, causing subsequent reduction of yield. In spite of this the yield for many trees was the heaviest in their history, being from 10 to 26 kg. per 10-year-old tree. Trees specially noted for high yield maintained

their superiority. It is apparent that while tung offers small reward to the peasant cultivator, chiefly on account of difficulties in marketing small quantities, it should prove a very profitable investment to owners of large estates. Despite statements to the contrary, tung has distinct soil preferences and is best suited by a light, deep, well-drained loam or sandy loam, in fact a soil which grows citrus well will grow tung. A climate of fairly high atmospheric humidity is preferable but not essential, if irrigation is available. The brittleness of the branches points to the need of windbreaks or other shelters. The presence of inferior types is at present a handicap which will be removed by constant selection. Tung begins to bear in the second year after planting and has a useful life of 30 years. It is advised that planting distance should be 8 to 9 metres apart for the permanent trees and that the intervening spaces should also be planted up with tung to be cut out in 6 years' time or after the fourth crop has been taken. The Tucuman Station is in a position after 6 years of selection to provide prospective planters with collections of trees propagated from proved high yielders and guaranteed to contain no unprofitable types. *Citrus.* Stock and variety trials have formed the principal work. The Genoa lemon on sour orange has proved particularly suited to this region; it bears regularly and freely, the fruit has a good appearance and the juice has quality. The yield on high ground without irrigation averaged 235 fruits per plant in the third year after planting and 913 in the sixth year, without the use of chemical manures. In the stock trials a four years' recording of young Genoa trees gave the following results. On sour orange an average total per tree of 1,937 fruits for the period; on Rangpur 1,682; on sweet lime 1,561; on mandarin Oneco 909. Trials with the lemons Lisbon, Eureka and Villafranca were by mischance on too small a scale for the results to be of full significance, but they are none the less interesting. Lisbon on sour orange, 4 years total average 1,292, on Rangpur 1,752, on sweet lime 988, on Oneco mandarin 1,209; Eureka on sour orange 1,393, on Rangpur 1,178, on sweet lime 1,573, on Oneco 1,508; Villafranca on sour orange 1,360, on Rangpur 1,350, on sweet lime 1,282, on Oneco 1,512. Hamlin and Parson Brown show themselves to be good early oranges. Hamlin sells the better, but Parson Brown is earlier and more productive. Fruit flies (*Anastrepha*) find the smooth skin of Hamlin more suitable for ovipositing than the rougher skins of later varieties and take action accordingly. In a bad year the loss may amount to 85% of the crop. Hamlin should not be planted in fruit fly districts. The grapefruit Triumph is also more susceptible than other varieties to fly attack. Robertson Navel is early and often ripens fruit the first year. If picked at the right moment the quality is excellent. Like most Navels it loses juiciness quickly with no outward sign that it has done so. On account of its strong growth it is liable to form imperfect unions on sour stock and the more vigorous Rangpur stock is recommended. The pink-fleshed seedless grapefruits Henniger's Ruby and Thompson are recommended. There is, however, in some markets, local and foreign, a slight prejudice against pink-fleshed grapefruit on the ground that customers erroneously attribute the colour to overripeness. Sour stock is largely used in Corrientes and the litoral because of its resistance to foot rot gummosis. Nevertheless Rangpur stock compares favourably with sour orange for yield when worked with the more popular sweet orange, and the fruit matures earlier. It is also particularly suited to the Tahiti lime, whereas sour orange is not. Trees on Rangpur grow much more strongly for the first 7 or 8 years than on sour orange, after which the position is reversed. *Papaya.* A virus disease with *Myzus persicae* and probably other aphids as vectors has proved very destructive. Imported seed from Buenos Aires Province has usually produced healthy plants in the Tucuman district but it failed to do so this season. The report deals also with a number of agricultural crops, including sugar.

1451. WÄDENSWIL (MEIER, K.) 634/635
Bericht der Eidgenössischen Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil für das Jahr 1940. **(Report of the Wädenswil Horticultural Research Station for 1940.)**
Landw. Jb. Schweiz, 1943, **57**: 419-61.

An account is given of the activities of the 54th year of the Wädenswil Institute. Investigations of which an account is given include the following: *Fruitgrowing.* Results of manurial experiments on fruit trees and investigations into soils used for fruitgrowing, are summarized, considerable emphasis being laid on the functions of potassium and on boron deficiency effects on apples. Experiments are reported on the life history and control of the red mite of fruit trees, *Paratetranychus pilosus*, and of codling moth, on scab and on shot hole disease. *Storage and processing.* Successful trials indicate the value of carefully prepared cellar or rock stores in which the temperature can be regulated at a low level between October and June. Trials on black, red and white currant juices and syrups are promising. Other experiments concerned the falling off in sulphurous acid content of stored fruit juices. *Vine growing.* Experiments have been continued on vine soil content, those on breeding and vegetative propagation allowed to lapse. A number of small trials on cultural points are reported. Nirosan has proved the first satisfactory arsenic substitute for control of grape moths. A number of American stocks and of direct producers have failed to maintain their resistance to phylloxera. A watch is being kept on eelworm infestation of vine roots. *Wine making.* Trials have concerned questions of acidity, change of colour, etc. *Small gardens.* Work includes breeding and selection of raspberries, vegetables and primulas, control of rose pests and diseases, control of celery diseases due to *Septoria apii*. Other work by the institute has included testing of apparatus, the control of food pests, trials of insecticides and fungicides—brief notes are given of 14 proprietary articles. The report ends with a list of publications by members of staff.

1452. WAITE. 633/635
Report of the Waite Agricultural Research Institute, S. Australia 1941-42, 1943, pp. 84.

Among subjects, which are mainly of agricultural interest, the following concern horticulture. Investigations on guayule were started in July 1942. Great difficulty was experienced in getting some of the seed to germinate. The best methods of overcoming this were found to be mechanical washing, treatment with chloride of lime, centrifuging and presprouting at controlled temperature and humidity. The plant itself developed best under irrigation, on soils of light to medium texture. Heavy and hard-setting soils proved unsuitable. Breeding work was devoted to potatoes, tomatoes and beans with a view to disease resistance. Large numbers of different latex-bearing plants were submitted to and investigated by the Botanical Section, but none was found to contain sufficient rubber to justify commercial utilization. Physiological studies of flax and tobacco are in progress. Among plant diseases investigated are rind blemish in stored oranges, and leaf mould and spotted wilt of tomatoes. The webbing caterpillar of the pyralid moth (*Loxostege affinitalis*) did some damage to garden crops and occurred for a time in plague numbers. The green vegetable bug (*Nazara viridula*) is noted as having become well established in S. Australia. A wasp parasite (*Microphanurus basalis*) has been introduced in an attempt to control it. Work is in progress on *Comperiella bifasciata*, a wasp parasite of the red scale of citrus (*Aonidiella aurantium*). The cabbage white butterfly (*Pieris rapae*) is becoming well established. Viruses under investigations include tomato spotted wilt and tobacco mosaic.

1453. RAHMLOW, H. J. (WISCONSIN). 634/635(775)
A history of seventy-five years of service by the Wisconsin State Horticultural Society,
Madison, Wisconsin, 1943, pp. 81, 10c.

Brief histories of the Wisconsin Beekeepers' Association,

Cranberry Association, Gladiolus Society, Garden Club Federation, Nurserymen's Association and Fruit Growers' Association, written for the Wisconsin State Horticultural Society in commemoration of its 75th annual convention.

1454. ZANZIBAR PROTECTORATE DEPARTMENT OF AGRICULTURE. 633/635

Annual Report of the Kizimbani Experiment Station for 1943, 1944, pp. 36, mimeographed.

Cloves. A significant response in terms of pounds of green cloves was obtained following the application of sulphate of ammonia and sulphate of potash over 4 to 5 years, and in normal times the response would have been financially profitable. Response could be observed within a year of the start of the experiment. Response to superphosphate has been negative. Interaction of N and P caused a reduction of yield which, while only statistically significant in the first year, in 5 years aggregated 133 lb. of green cloves per acre. The interaction of N and K is important since separately they increase yield but in combination reduce it, at any rate on young trees receiving heavy dressings. Interaction between P and K is insignificant. Interaction of N, P and K amounted to an aggregate loss of 130 lb. of cloves per acre for a 5-year period, dressings being heavy, at the rate of 1,000 lb. per acre. The opinion that girth measurement is a useful criterion of vigour obtained further confirmation from these experiments. Manurial trials with organic manures suggest that sulphate of ammonia might well be replaced by coconut meal, which has the further advantage of a 2% K_2O content. The various shades used for young plants, namely sugar cane, banana, cassava and *Gliricidia maculata* did not reduce soil moisture to a greater extent than is found in unshaded surroundings containing Imperata grass. The value of the shade tree lies in the reduction of the drying power of the air around the seedling. Shading and watering proved the best method of preserving newly transplanted seedlings during the first dry season. Daily watering since November 1942 has had no effect in checking sudden death disease. No improvement of growth was obtained in seedling cloves by cutting them back with varying severity on transplantation, and in the case of severe cutting, i.e. to 12 in. and below, the plants usually died. *Coconuts.* The combined cultivation and manurial trial showed no significant results between the various treatments and has been ended. Annual cropping under coconuts is to be tried on a grove infested with Imperata grass and showing steadily declining yields. *Pineapples.* Nitrogen as sulphate of ammonia again increased number and total weight of fruit as, to a less extent, did also K and N+K. The close of the spacing experiment showed that close planting, 12,906 plants per acre, gave the highest yield but provided difficulties in the performance of various cultural operations. A graph has been constructed, but is not reproduced, showing the approximate percentage over a certain critical weight in a sample of pineapples when the total weight and number of fruit in the sample is known. The graph would be valuable to a factory purchasing large numbers of canning fruit and also in assessing the commercial value of various experimental treatments. The paper embodying the graph has been submitted for publication. Brief notes are given on certain other tropical crops and on a number of experiments recently laid down.

1455.

The following publications have also been examined:—

CANADA, NATIONAL RESEARCH COUNCIL.
Twenty-sixth Annual Report of the National Research Council of Canada, 1942-43, pp. 35 (pp. 38 in French bound in), being *N.R.C.* **1169.**

U.S. DEPARTMENT OF AGRICULTURE.
Research work of the U.S. Department of Agriculture, over-all descriptive statement, Nov. 15, 1941, stencil foolscap pp. 53.

CYPRUS.
A.R. of the Director of Agriculture, Cyprus, for the year 1943, 1944, pp. 4, 3 piastres.